UD-72B
Carrier to Noise Test Set

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instruction book

UD-72B
Carrier to Noise Test Set

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1200 KONA DRIVE
COMPTON, CA 90220
(213) 642-5317

UD-72B CARRIER TO NOISE TEST SET

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INSTRUCTION BOOK INTRODUCTION

1. INSTRUCTION BOOK CONTENTS AND USE

This instruction book covers the UD-72B Carrier to Noise Test Set, and the modules/units comprising the system. The following sections are included: front matter, general, theory, preparation for use and reshipment, installation, operation, diagrams, and maintenance.

FRONT MATTER: In addition to this introduction, the front matter includes a title page, table of contents, safety precautions, warranty/repair information, and a glossary. The safety precautions portion covers general consideration; specific precautions are included in the instruction book where applicable as cautions or warnings.

GENERAL: This section contains purpose-function description, and characteristics information for the system/subsystem covered by this instruction book. In addition, a listing of configurations is included.

THEORY: A circuit description is provided for the overall system and for each module/unit.

PREPARATION FOR USE AND RESHIPMENT: Instructions are included for unpacking and inspection, installation, and making external (interface) connections. Also, an initial operation procedure is included.

OPERATION: This section contains a general operation explanation, turn on, turn off, and operations procedure, and identification of controls and indicators.

DIAGRAMS: This section contains an information drawing for each module/unit comprising the system. The information drawing includes a parts list, parts location illustration, and schematic diagram.

MAINTENANCE: This section contains a list of recommended test equipment, procedures for periodic checks, detailed checks and adjustments, trouble analysis information, and module replacement procedures for modules requiring in-system alignment.

2. ARRANGEMENT WITHIN SECTION

The Rockwell equipment usage identifier appears at the top outer corner of each page. The Rockwell publication number is located at the top inner corner of each page.

SAFETY PRECAUTIONS

While the manufacturer has attempted to detail in this manual all areas of possible danger to personnel in connection with the use of this equipment, personnel should use caution when installing, checking out, operating, and servicing this equipment. As with all electronic equipment, care should be taken to avoid electrical shock in all circuits where substantial currents or voltages may be present, either through design or short circuit.

Definitions of warnings, cautions, and notes used throughout this manual are as follows:

WARNING

An operating procedure, practice, etc, which, if not correctly followed, could result in personal injury or loss of life.

CAUTION

An operating procedure, practice, etc, which, if not strictly observed, could result in damage to, or destruction of, equipment.

NOTE

An operating procedure, condition, etc, which it is essential to highlight.

WARRANTY/REPAIR INFORMATION

NOTICE - Where the contents of this information conflict with the contract of purchase, the requirements of the contract of purchase shall govern.

1. GENERAL WARRANTY PROVISIONS

The Rockwell International Collins Transmission Systems Division guarantees to repair, replace, or refund the purchase price of any equipment, accessories, or parts it manufactures that are defective as to design workmanship or materials, or which are not suitable for their intended purpose set forth in the contract of purchase, provided:

a. Notice of the claimed defect or unsuitability is given in writing to the Collins Transmission Systems Division within one (1) year after delivery, acceptance, or use, whichever is earlier.

b. The defective or unsuitable equipment accessory or part is returned to the Collins Transmission Systems Division, transportation prepaid, in accordance with the instructions given in paragraph 2.

c. An inspection of the returned goods by The Collins Transmission Systems Division at the factory indicates that the defect or unsuitability was not cuased by abuse or improper use, maintenance, repair, or alteration by other than the Collins Transmission Systems Division or an authorized service center.

2. REPAIR POLICY

Refer to the microwave customer service information publication (523-0601448) for a statement of procedure to obtain repair of defective modules, parts, and equipment in or out of warranty.

GLOSSARY OF TERMS

AGC:	automatic gain control
BER:	bit error rate
bw:	bandwidth
C:	capacitor
CR:	diode
dB:	decibel
dB box:	maximum to minimum variation over specified frequency range
dBm:	decibel referenced to 1 milliwatt into 75 ohms
DS:	lamp
DS3:	44.7 Mb/s bipolar digital data stream
Hz:	Hertz - frequency in cycles per second
if.:	intermediate frequency
J:	jack or female coupler
JF:	jackfield - arrangement of jacks
kg:	kilograms (1000 grams)
L:	choke or coil
MHz:	megahertz
MDR:	microwave digital radio
mm:	millimeter
P:	plug or male coupler
Q:	transistor
R:	resistor
rf:	radio frequency
S:	switch
V:	voltage
V ac:	voltage measured as alternating current
V dc:	voltage measured as direct current
W:	watts

GENERAL

UD-72B-(1-7) CARRIER TO NOISE TEST SET

GENERAL

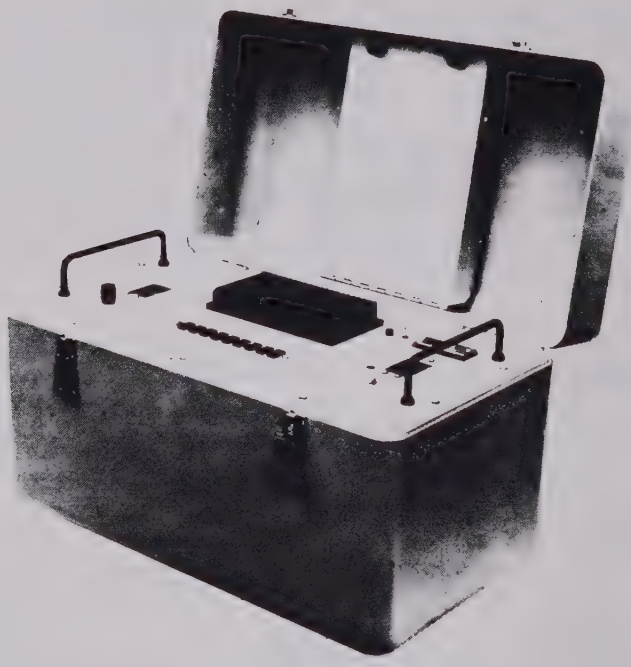


Figure 1. UD-72B Carrier to Noise Test Set.

1. PURPOSE/FUNCTION

The UD-72B Carrier to Noise Test Set (figure 1) generates an output of shaped random noise with the amplitude response vs the frequency of the output noise the same as the MDR series microwave digital radios. The test set is a portable system used for threshold testing and adjustment of MDR series radios.

The carrier to noise test set generates broadband white noise, and by the use of filters shapes this noise signal to a specified bandwidth. for test purposes, this filtered noise is inserted between the if. amplifier and the demodulator of an MDR series radio. Depending on the test set configuration (table 1), from one to three different noise bandwidth filters are available. The required filter is selected by the use of two coax looping plugs. The test set has a variable level adjustment and a step attenuator.

2. DESCRIPTION

The carrier to noise test set is a portable, self-contained device with all of the fittings and cables required for signal insertion supplied. The test set is enclosed in a metal box measuring 304 by 330 by 546 mm (12 by 13 by 21.5 in) and weighing 15.4 kg (34 lb). The test set is available in seven configurations (table 1).

3. CHARACTERISTICS

The carrier to noise test set is a portable, solid-state, completely contained unit consisting of a noise generator, filter/equalizers, a 70 MHz broadband amplifier, a step attenuator, a buffer amplifier, and a regulated power supply.

The power and signal outputs are accessible through the front panel. The removable cover contains the power cord, signal cable, termination plug, looping plug, and directional coupler. Physical and electrical characteristics are listed in table 1.

Table 1. UD-72B Physical, Environmental, and Electrical Characteristics.

ITEM	CHARACTERISTICS	
1. Size	304 by 330 by 546 mm (12 by 13 by 21.5 in)	
2. Weight	15.4 kg (34 lb)	
3. Power Requirements		
a. Voltage	115 V ac to 230 V ac ±10%, selectable by a plug-in printed circuit board mounted within the fuseholder	
b. Frequency	47 to 440 Hz	
c. Power	Not more than 100 W	
4. Directional Coupler	Through Path	Coupled Path
a. Loss	Not more than 0.6 dB	Not more than 21 dB
b. Variation in Loss vs Frequency	0.2 dB box	0.2 dB box
c. Return Loss (Input, Output)	Not less than 26 dB	Not less than 26 dB
5. Output		
a. Type	Band-limited random noise	
b. Bandwidth	Optional - 20, 30, or 40 MHz	
c. Power	+10 dBm for any bandwidth at front panel	
d. Impedance	75 ohms	
6. Options		
a. UD-72B-1	Provided with filter/equalizer for 20 MHz bw	
b. UD-72B-2	Provided with filter/equalizer for 30 MHz bw	

Table 1. UD-72B Physical, Environmental, and Electrical Characteristics (Cont).

ITEM	CHARACTERISTICS	
6. Options (Cont)		
c. UD-72B-3	Provided with filter/equalizer for 40 MHz bw	
d. UD-72B-4	Provided with filter/equalizer for 20, 30 MHz bw	
e. UD-72B-5	Provided with filter/equalizer for 20, 40 MHz bw	
f. UD-72B-6	Provided with filter/equalizer for 30, 40 MHz bw	
g. UD-72B-7	Provided with filter/equalizer for 20, 30, 40 MHz bw	
8. Environmental	Operating	Nonoperating
a. Temperature	10 to 40°C (50 to 104°F)	-40 to +70°C (-40 to +158°F)
b. Humidity	95% relative humidity (without condensation	95% relative humidity (without condensation)

4. EQUIPMENT LISTING

Table 2 lists the equipment supplied with the carrier to noise test set. Table 3 lists and describes the equipment required for use in operation of the test set.

Table 2. Supplied Equipment.

ITEM	DESCRIPTION
1	Power Cord, 2286 mm (7.5 ft) in length
2	Coax cable, 2438 mm (8 ft) in length
3	Directional coupler
4	75 ohm termination

Table 3. Equipment Required But Not Supplied.

ITEM	DESCRIPTION
	NOTE Ensure that meter used has thermal power sensing, not diode rms sensing.
RF Power Meter	Hewlett-Packard 436A Power Meter with 8483A 75 Ohm Power Sensor or equivalent (thermistor sensing)
	CAUTION 75 Ohm Type N connector will not mate with standard Type N connector without damage. Marking of special adapter is recommended
Adapter, BNC-to-Type N	PN 357-9173-000
Spectrum Analyzer	Hewlett-Packard 141T with 8552B and 8553B plug-in sections or equivalent
DS3 Test Set	PN UD-72A, DS3 Test Set
TX/RX Test Set	Tau-Tron S-5200C Transmitter/Receiver Test Set or equivalent
Minimum Loss Pad, 50 to 75 Ohms	PN 126-2443-010

THEORY

UD-72B CARRIER TO NOISE TEST SET

THEORY

1. GENERAL

This section contains a general description of the functional flow of noise generation, shaping, and output and a specific description of each subassembly or module.

The carrier to noise test set produces band limited random noise used to test the threshold bit error rate (BER) of the MDR series radios. Bandwidths available are 20, 30, and 40 MHz. The five basic modules within the test set are the following:

a. Noise generator module

b. IF filter/equalizer module

c. AGC amplifier module

d. Step attenuator

e. Noise amplifier module

2. SYSTEM FUNCTIONAL DESCRIPTION

Within the carrier to noise test set (figure 1), the white noise is generated by the noise generator module and is routed through a coax jackfield to the filter/equalizer module, which provides amplification, bandpass filtering, and filter delay equalization. The output of the filter/equalizer is applied to the AGC amplifier through a second coax jackfield. The jackfields are used to switch between the different bandwidths, if so equipped. The AGC amplifier, not used in an AGC function, is gain-adjusted by an external potentiometer. The second jackfield contains the switches that control application of power to the filter/equalizer modules. The amplified signal is applied to the step attenuator, allowing adjustment of the output gain in known steps of attenuation. The output of the attenuator is applied to the noise amplifier module, where it is amplified, buffered, and maintained at an output impedance of 75 ohms for the entire noise spectrum.

3. SUBSYSTEM FUNCTIONAL DESCRIPTION

For module block diagrams and/or schematics of the subsystems described in this section, refer to the Diagram Section (CLNS-10-401).

3.1 Noise Generator Module

The noise generator consists of a standard product line if. preamplifier modified by adding a noise diode to the input circuit.

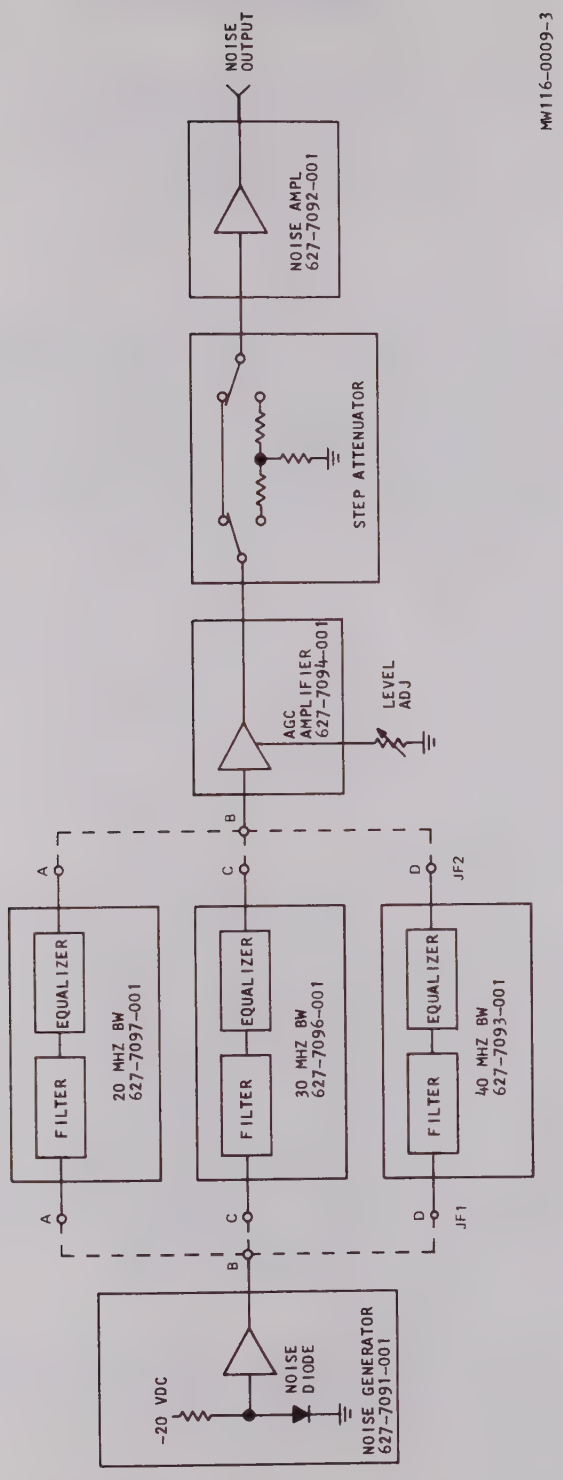


Figure 1. UD-72B-( ) Carrier to Noise Test Set Block Diagram.

The diode is of a special design that will generate broadband random noise from 1 to 500 MHz. This noise is approximately 39 dB more than the noise generated by a 50 ohm resistor.

Noise diode (CR101) and required biasing resistor (R101) are installed in holes already provided on the circuit board. The output noise is coupled into the first amplifier stage (Q1) where the signal level is increased. The noise is then amplified by a common base gain stage (Q2) and buffered by two emitter followers (Q3 and Q4) that drive the output to the if. filter/equalizer. This amplifier produces a minimum gain of 30 dB in a bandwidth in excess of the 40 MHz required by the test set.

3.2 Filter/Equalizer Module - 40 MHz Bandwidth

This module is found only in UD-72B-(3, 5, 6, and 7) Carrier to Noise Test Sets.

The incoming white noise signal is first processed through the preliminary AGC amplifier, which consists of a common base gain stage (Q401) buffered by two emitter followers (Q402 and Q403), driving a diode attenuator (CR401 through CR404) in series with the input of a second common base stage (Q404). The gain is controlled by varying the dc current to the diodes (CR401 through CR404). The AGC is not used; attenuation is biased on with a fixed resistor.

The amplified noise signal is then applied to the filter/equalizer network consisting of a modified 5-pole Nyquist filter and six delay equalizers. The filter (L404 through 409, C415, C416, C418, C419, C421, C422, C427, C428, C430, C438, C444, and C449) determines the bandwidth of the filter/equalizer. The six delay amplifiers compensate for the filter differential delay. Buffer amplifiers (Q405 through Q410) isolate each equalizer and the filter.

3.3 Filter/Equalizer Module - 30 MHz Bandwidth

This module is found only in UD-72B-(2, 4, 6, and 7) Carrier to Noise Test Sets.

The circuit description is identical to the 40 MHz bandwidth filter/equalizer (paragraph 3.2), the difference being component values.

3.4 Filter/Equalizer Module - 20 MHz Bandwidth

This module is found only in UD-72B-(1, 4, 5, and 7) Carrier to Noise Test Sets.

The circuit description is identical to the 40 MHz bandwidth filter/equalizer (paragraph 3.2), the difference being component values.

3.5 AGC Amplifier Module

The AGC amplifier consists of five identical common base amplifiers (Q5, Q8, Q11, Q14, and Q17) buffered by dual emitter-follower stages (Q6, Q7, Q9, Q10, Q12, Q13, Q15, Q16, Q18, and Q19). The five stages are separated from each other with diode attenuators (CR5 through CR12) to control gain.

The amplified noise signal is applied to the harmonic filter (L11 through L13, C54 through C58) to suppress the second harmonic of 70 MHz.

The amplifier output level is controlled by an external LEVEL ADJUST control (R125) mounted on the front panel of the test set.

3.6 Step Attenuator

The control mechanism consists of nine rocker-type switches that insert a specified attenuation. The individual values are additive such that any value of attenuation from 0 to 82.5 dB in 0.5 dB increments may be selected.

The frequency range of the attenuator is from dc to 500 MHz with an impedance of 75 ohms.

3.7 Noise Amplifier Module

The noise amplifier module is a wideband, high-output linear amplifier. The amplifier consists of a single CA2875R thin-film amplifier hybrid mounted in a shielded enclosure with power and rf connectors.

PREPARATION FOR USE AND RESHIPMENT

UD-72B CARRIER TO NOISE TEST SET

PREPARATION FOR USE AND RESHIPMENT

1. GENERAL

This section contains the instructions and precautions to be observed in unpacking, use, storage, and repacking the carrier to noise test set.

2. UNPACKING AND INSPECTION

The carrier to noise test set is shipped in a disposable container.

2.1 Unpacking

WARNING

Use of improper or unbalanced lifting technique can result in back injury. Observe safe or recommended lifting practices.

Before opening the packing container, inspect for visible signs of abuse or mishandling. If damage is evident, notify the shipping company and Rockwell-Collins. After opening container, remove enough packing material to expose the test set. Using handle located at the top of the test set, lift the test set carefully from the shipping container.

2.2 Inspection

After removal of the test set from the shipping carton, open the cover and ensure that the set contains all items on the packing list and that there appears to be no physical damage to the equipment.

3. INSTALLATION

The carrier to noise test set is a self-contained, portable unit used for testing MDR series radios. Installation requires injection of a noise signal from the test set into an MDR series radio by means of a directional coupler (refer to the manual of the specific MDR radio for connection and use).

4. EXTERNAL CONNECTIONS

4.1 Strapping Option

If so equipped, the unit may be strapped by use of two looping plugs in two jackfields to generate any one of three different random-noise bandwidths of 20, 30, or 40 MHz.

4.2 Power and Ground Connections

CAUTION

Use of improper voltage will damage the test set. Apply only specified voltages to the test set.

Power input to the test set is either 115 or 230 volts ac. The three conductor ac cable supplied with the test set is for use with U.S. domestic 115 volt ac power mains only. When the test set is used with domestic 230 volt ac mains or with foreign power mains, power is applied through a customer-supplied cable.

4.3 Cable Connections

Cable connections required for the test set are minimal. They consist of connecting a coax cable to a directional coupler that is inserted in the signal path of an MDR series radio.

5. INITIAL CHECKOUT

NOTE

If any requirements of the checkout cannot be met, proceed to Maintenance Section, CLNS-10-501, paragraph 6.

Perform the procedures described in this section to place the carrier to noise test set in service.

5.1 Prerequisites

a. Inspect the test set for signs of damage.

b. Check that the voltage selector circuit (POWER INPUT, figure 1) is in the correct position, with the required voltage (either 115 or 230 volts) displayed at the upper left hand corner.

c. Ensure that the ON/OFF switch is OFF.

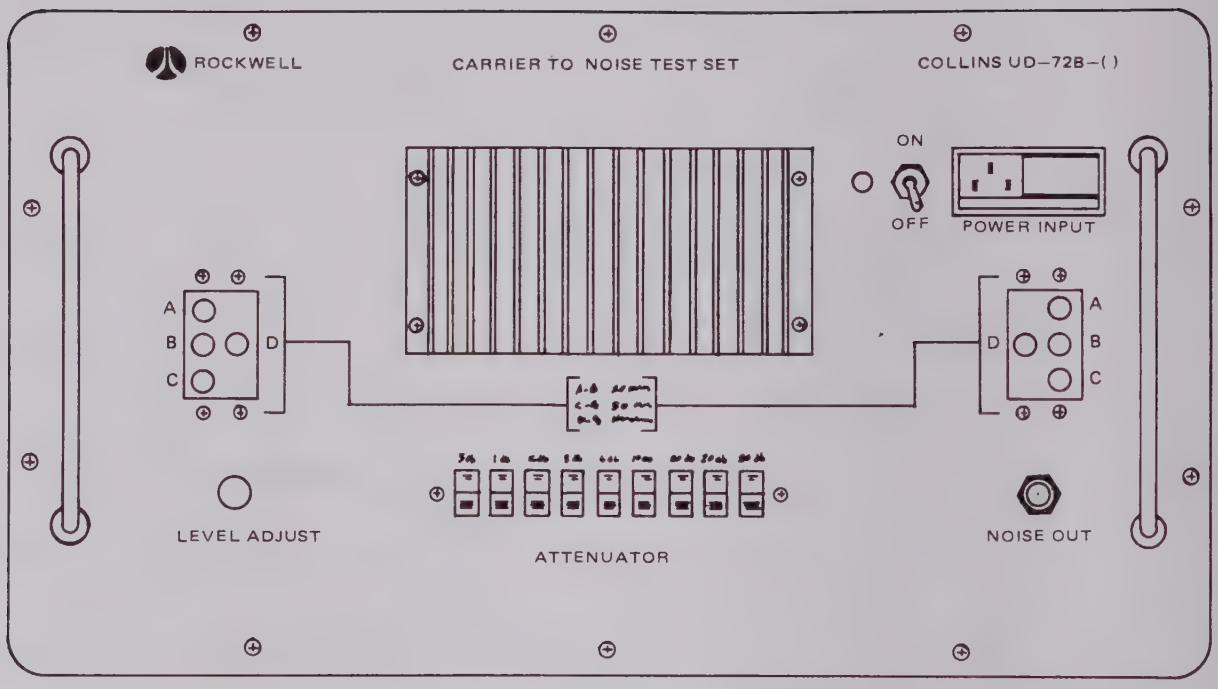
d. Connect the power cord from the test set to the source.

5.2 Turn On

Turn the power switch to the ON position and observe that the pilot lamp lights.

5.3 Signal Level Measurement

a. Using 75 ohm COAX cable, connect NOISE OUT on the test set front panel to the input of the rf power meter (figure 2).



ITEM	FUNCTION
CONTROLS: ON/OFF SWITCH	APPLIES LINE VOLTAGE TO INTERNAL POWER SUPPLY.
ATTENUATOR	NINE-SWITCH ATTENUATOR INSERTS ATTENUATION TO THE SIGNAL PATH, PROVIDING A STEP ATTENUATION OF THE OUTPUT FROM 0.0 TO 82.5 DB IN STEPS OF 0.5 DB.
JACKFIELD	ALLOWS THE OPERATOR TO SELECT, BY MEANS OF LOOPING PLUGS, THE THREE INTERNAL IF. FILTER/EQUALIZERS.
LEVEL ADJUST	PROVIDES ADJUSTMENT OF THE OUTPUT LEVEL OF THE BANDWIDTH LIMITED NOISE.
INDICATORS: PILOT LIGHT	INDICATES THAT LINE VOLTAGE IS APPLIED INTERNALLY.
FUSEHOLDER	BLOWN FUSE INDICATES PROBLEM INTERNALLY. CIRCUIT CARD WITHIN HOLDER INDICATES VOLTAGE LEVEL THAT TEST SET IS ADJUSTED FOR.
NOISE OUT	SIGNAL POINT FOR THE OUTPUT OF THE TEST SET.

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Figure 1. Carrier to Noise Test Set, Controls and Indicators.

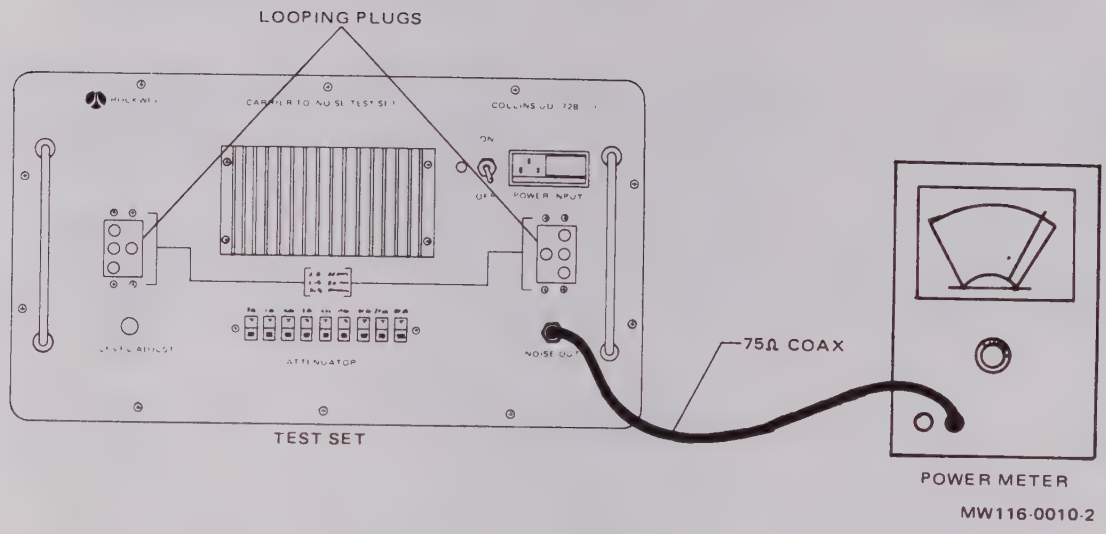


Figure 2. Signal Level Measurement Connections.

NOTE

Jackfield connections for each of the three possible noise bandwidths are silkscreened on the test set front panel below the heat sink.

b. In the two jackfields in the test set front panel insert the noise bandwidth looping plugs to connect the required if. filter/equalizer.

c. Set the ATTENUATOR switches for 0 dB.

d. Adjust LEVEL ADJUST for an average reading on the rf power meter of +10 dBm.

NOTE

The number and bandwidths of filter/equalizers contained in each model of UD-72B(1-7) Carrier to Noise Test Set are listed in CLNS-10-001, GENERAL, Table 1, item 6, Options.

e. If the test set is equipped with only one filter/equalizer, disconnect the test equipment. If the test set contains two or three filter/equalizers, leave the test equipment connected and perform the procedure described in paragraph 5.4.

5.4 Additional Signal Level Measurements

a. If the test set is equipped for more than one bandwidth, perform the procedure described in paragraph 5.3, steps b., c., and d. for each additional bandwidth.

b. Disconnect the test equipment.

6. STORAGE AND RESHIPMENT

6.1 Storage

The carrier to noise test set may be stored for periods up to one year in its own protective shell, provided it is not subject to long periods of humidity above 95 pe cent and/or temperature outside the range -40° to +70°C (-40° to +158°F).

If longer storage is anticipated, the unit should be wrapped in polyethylene film.

6.2 Packing for Reshipment

NOTE

Authorization is required before shipping. Do not ship until proper authorization is obtained.

The following procedures should be used to prepare the test set for shipment.

a. A cardboard container should be obtained that allows a minimum of 100 mm (4 in) of clearance for each surface.

b. Secure all components and accessories within their proper receptacles and secure the lid on the test set with the snap fasteners.

c. Fill the bottom of the cardboard carton with approximately 150 mm (5 in) expanded foam.

d. Place test set in container and finish filling with packing material.

e. Seal the container with a good grade of reinforced packing tape.

f. A wooden container should be constructed on the outside for added protection.

UD-72B CARRIER TO NOISE TEST SET

OPERATION

1. GENERAL

Operation of the carrier to noise test set consists of selecting the bandwidth to match the MDR series microwave digital radio, making cable connections, and applying power.

2. TURN-ON PROCEDURE

Check the voltage selector for proper insertion, connect the power cord from the source to POWER INPUT on the test set front panel, and set the ON/OFF switch to ON. The indicator lamp should light, and the test set is ready for use.

3. OPERATING PROCEDURE

Operation is initiated by selecting, by means of the looping plugs in the front panel jackfields (figure 1), the noise bandwidth compatible with the MDR series radio being tested. The coax cable and directional coupler provided in the test set are used to inject a noise signal between the if. AGC/equalizer and the demodulator of the radio. The specific test procedure is determined in the BER and slicing test procedure found in related microwave digital radio test procedures.

4. TURN-OFF PROCEDURE

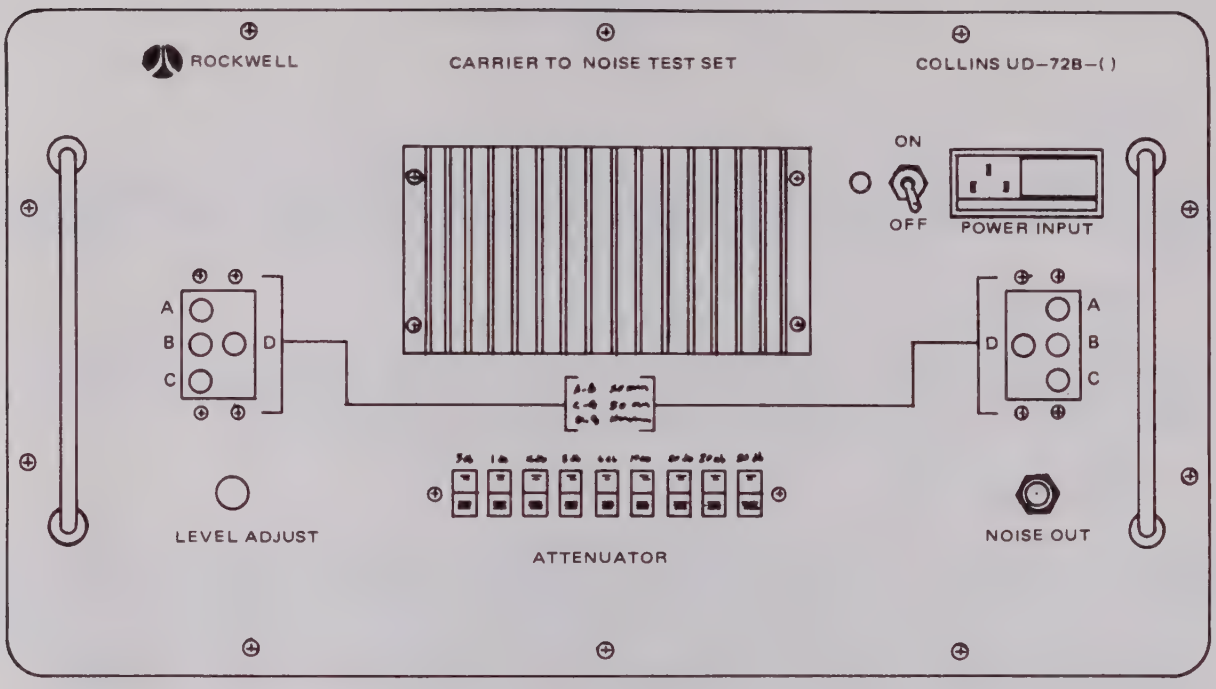
Disconnect the test set from the radio under test and set the power switch to OFF. Disconnect the power cord and store.

5. EMERGENCY OPERATION

There is no emergency operation of this test set. Malfunction requires repair.

6. CONTROLS AND INDICATORS

The controls and indicators are located and described in figure 1.



ITEM	FUNCTION
CONTROLS: ON/OFF SWITCH	APPLIES LINE VOLTAGE TO INTERNAL POWER SUPPLY.
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JACKFIELD	ALLOWS THE OPERATOR TO SELECT, BY MEANS OF LOOPING PLUGS, THE THREE INTERNAL IF. FILTER/EQUALIZERS.
LEVEL ADJUST	PROVIDES ADJUSTMENT OF THE OUTPUT LEVEL OF THE BANDWIDTH LIMITED NOISE.
INDICATORS: PILOT LIGHT	INDICATES THAT LINE VOLTAGE IS APPLIED INTERNALLY.
FUSEHOLDER	BLOWN FUSE INDICATES PROBLEM INTERNALLY. CIRCUIT CARD WITHIN HOLDER INDICATES VOLTAGE LEVEL THAT TEST SET IS ADJUSTED FOR.
NOISE OUT	SIGNAL POINT FOR THE OUTPUT OF THE TEST SET.

MW116-0012-2

Figure 1. Carrier to Noise Test Set Controls and Indicators.

UD-72B CARRIER TO NOSIE TEST SET

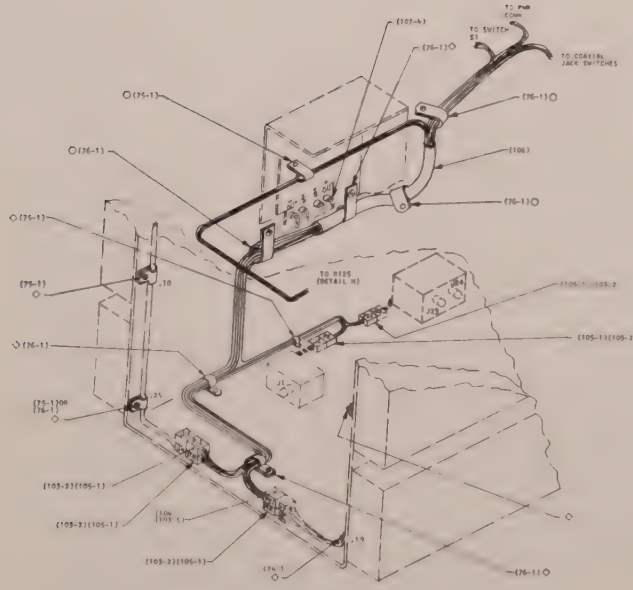
DIAGRAMS

1. GENERAL

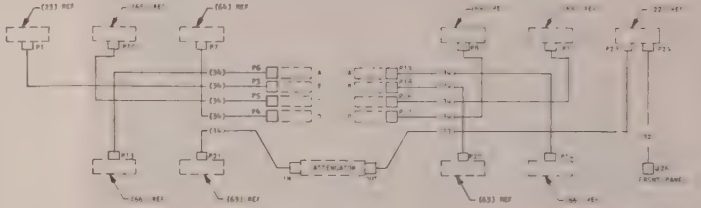
This section contains the schematics, parts lists, and assembly drawing of the test set and the modules contained within.

2. CROSS-REFERENCE

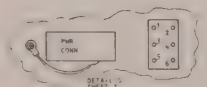
DIAGRAM	NUMBER
Carrier to Noise Test Set UD-72B( )	622-4114
Noise Generator Assembly	627-7091
70 MHz Noise Amplifier Assembly	627-7092
Filter Equalizer Assembly	627-7093
AGC Amplifier Assembly	627-7094
AGC Amplifier	636-8285
Filter/Equalizer, 40 MHz BW	636-8287
Filter/Equalizer, 30 MHz BW	640-5659
Filter/Equalizer, 20 MHz BW	640-5660
IF Preamplifier	795-7418



DETAIL F
SEE SHEET 2
APPROXIMATE CABLE LAYOUT
(SEE NOTE 3)



DETAIL C
SEE SHEET 2
CORD WIRING INFORMATION
(SEE NOTE 2 AND 3).



DETAIL G
SHEET 2
REAR VIEW OF FRONT PANEL, SHOWING POWER SWITCH PIN NUMBERS

DETAIL H
SHEET 2
REAR VIEW OF R13S SHOWING PIN NUMBERS

FROM-TO WIRE LIST

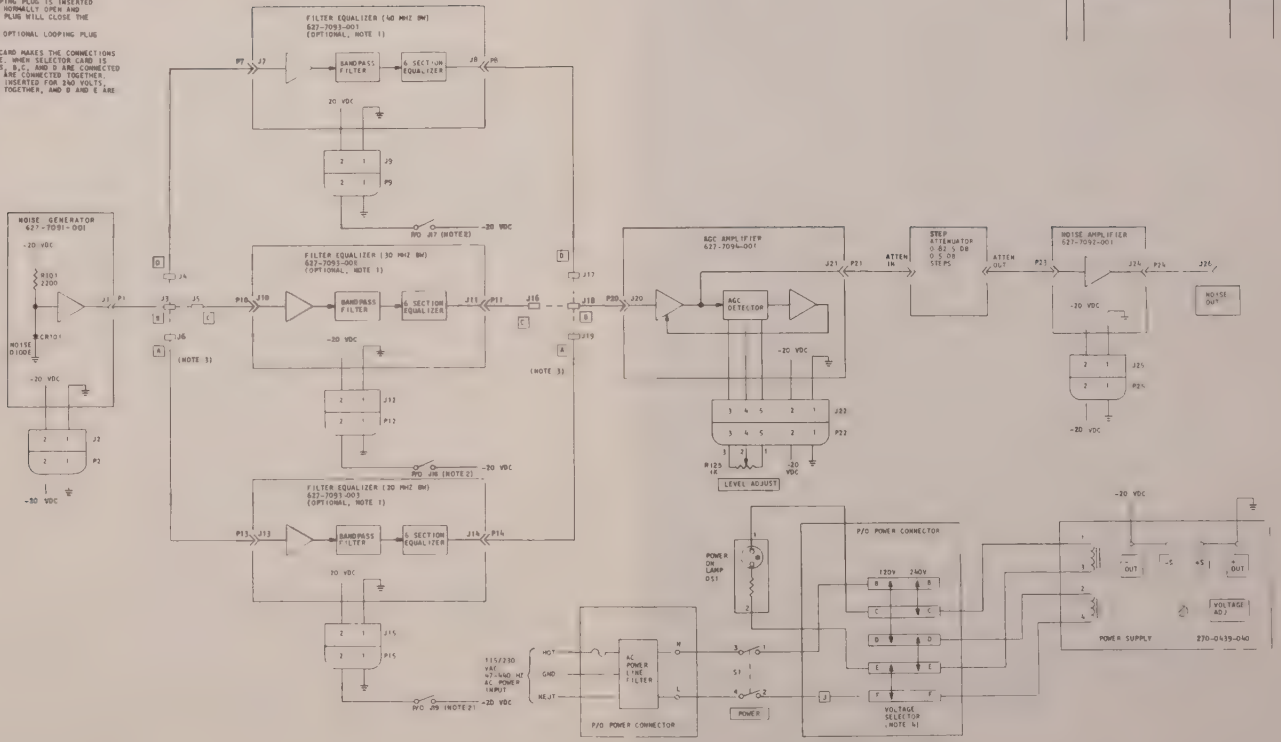
WIRE NO	WIRE CODE	WIRE PART NUMBER	FROM	USED W/ ITEM	TO	
1	CC1	439-8[illegible]-000	POWER CONN-N		POWER SW [illegible]	
2	CC1	439-8[illegible]-000	POWER CONN-N		POWER SW [illegible]	
3	CC2	439-8[illegible]-000	POWER CONN-B		POWER SW [illegible]	
4	CC3	439-81[illegible]-000	POWER CONN-		POWER SW [illegible]-2	
5	CC4	439-81[illegible]-000	POWER CONN-		POWER SUPP [illegible]	
6	CC5	439-8[illegible]-000	POWER CONN-		POWER SUPP [illegible]	
7	CC6	439-8[illegible]-000	POWER CONN-E		POWER SUPP [illegible]	
8	CC7	439-8[illegible]-000	POWER CONN-		POWER SUP [illegible]	
9	DAC	439-[illegible]-000	P2	[illegible]	POWER SUP [illegible]	
10	DA7	439-[illegible]-000	P2-7	[illegible]	POWER SUP [illegible]	
11	DA2	439-[illegible]-000	P2-[illegible]	[illegible]	POWER SUP [illegible]	
12	DA3	439-[illegible]-000	P2-[illegible]	[illegible]	[illegible]	SEE NOTE 4
13	DA4	439-[illegible]-000	[illegible] SW TECH NC		POWER SUP [illegible]	SEE NOTE 4
14	DA5	439-[illegible]-000	P12-[illegible]	[illegible]	POWER SUP [illegible]	
15	DA6	439-[illegible]-000	P12-[illegible]	[illegible]	[illegible]	SEE NOTE B
16	DA7	439-[illegible]-000	[illegible] SW TECH NO		POWER SUPP [illegible]	SEE NOTE B
17	DA8	439-[illegible]-000	P15-[illegible]	[illegible]	POWER SUP [illegible]	
18	DA9	439-[illegible]-000	P15-2	[illegible]	[illegible]	SEE NOTE B
19	DA10	439-[illegible]-000	[illegible] SW TECH NC		POWER SUP [illegible]	SEE NOTE B
20	DA91	439-7039-000	P22-[illegible]	[illegible]	POWER SUPP [illegible]	
21	DA92	439-7039-000	P22-3	[illegible]	POWER SUP [illegible]	
22	DA93	439-7035-000	P22-3	[illegible]	[illegible]	
23	DA95	439-7036-000	P22-[illegible]	[illegible]	[illegible]	
24	DA96	439-7032-000	P22-5	[illegible]	POWER SUP [illegible]	
25	DA902	439-7038-000	P14-[illegible]	[illegible]	POWER SUPP [illegible]	
26	DA903	439-7039-000	P22-[illegible]	[illegible]	POWER SUP [illegible]	
27	BUS	421-2220-000	POWER SUPPLY, 20"		POWER SUPP [illegible]	
28	BUS	421-2220-000	POWER SUPPLY, 5 +		POWER SUP [illegible]	
29	CC2	439-81[illegible]-000	POWER CONN-[illegible]	[illegible]	[illegible]	
30	N/A	P/O ITEM 31	DS1- [illegible]		POWER CONN	
31	N/A	P/O ITEM 31	DS1- [illegible]		POWER CONN	

SIZE	CODE IDENT	DWG NO
D	13499	422-[illegible]
SCALE NONE	REV C	SHEET 1

NOTES:

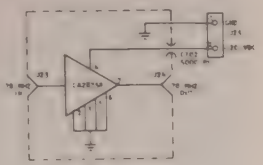
1. UNIT CAN BE EQUIPPED WITH 1, 2, OR 3 FILTER EQUALIZER ASSEMBLIES WITH ANY COMBINATION OF BANDWIDTHS
2. SWITCH IS PART OF COAXIAL JACK ASSEMBLY AND IS ACTIVATED WHEN LOOPING PLUG IS INSERTED INTO JACK. SWITCH IS NORMALLY OPEN AND INSERTING THE LOOPING PLUG WILL CLOSE THE CONTACTS.
3. DASHED LINES INDICATE OPTIONAL LOOPING PLUG LOCATIONS
4. THE VOLTAGE SELECTOR CARD MAKES THE CONNECTIONS SHOWN FOR EACH VOLTAGE. WHEN SELECTOR CARD IS INSERTED FOR 120 VOLTS, B,C, AND D ARE CONNECTED TOGETHER, E AND F ARE CONNECTED TOGETHER. WHEN SELECTOR CARD IS INSERTED FOR 240 VOLTS, A AND C ARE CONNECTED TOGETHER, AND D AND E ARE CONNECTED TOGETHER

REVISIONS			
LTR	DESCRIPTION	DATE	APVD
A	J 54263	11-17-77	JH
B	- 55354	2-1-78	JH
C	J-59449 N/A	10-25-78	JH

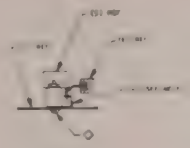


SCHEMATIC DIAGRAM
CARRIER TO NOISE TEST SET
UD-7218-( )

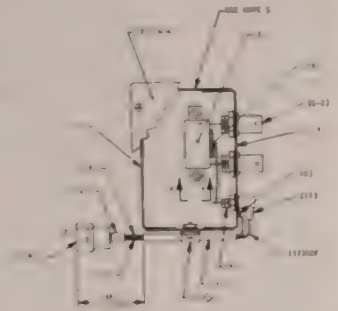
SIZE	CODE IDENT	DWG NO	
D	13499	6221N114	
SCALE		REV C	SHEET 4



SCHEMATIC



SECTION A-A



C.	S		
0.5	10	439-7031-000	WIRE, 22 GA WHT
0.5	17	439-7068-000	WIRE, 22 GA RED
1.0	16	[illegible]	MARKER, CABLE
0.1	15	152-1571-000	SLEEVING
4.0	14	330-1759-130	SCREW [illegible]
	13	[illegible]	[illegible]
	12		
1.0	11	686-6675-001	BOOM, TERMINAL
1.0	10	304-0196-000	LUG, TERMINAL SOLDER
1.0	9	241-5007-010	CAP, [illegible]
2.0	8	372-0021-010	CONN PIN
1.0	7	372-5909-100	CONN HOUSING J25
2.0	6	357-7529-070	CONN J23, J24
1.0	5	150-1554-000	CLAMP, CABLE
1.0	4	640-2922-001	STRIP, GROUNDING
1.0	3	351-2436-020	[illegible] L620750
1.0	2	640-2061-007	COVER
	1		

ROCKWELL INTERNATIONAL CORPORATION
COLLINS RADIO GROUP

D 13499

NOTES

1. PARENTHETICAL ITEM IDENT DENOTES (ITEM NO -QTY)
2. TEST OF COMPLETED ASSEMBLY IS DONE AT A HIGHER TOP LEVEL ASSEMBLY.
3. REMOVE EXISTING PIN/SOCKET AT E602 AND E665 BEFORE CONNECTING WIRES
4. UNLESS OTHERWISE SPECIFIED: ALL RESISTANCE VALUES IN OHMS, ALL CAPACITANCE VALUES IN PICOFARADS
5. ASSY PER 627-9356-001 APPROX WHERE SHOWN
6. UNLESS OTHERWISE SPECIFIED ALL HARDWARE TO BE DEFINED AS FOLLOWS:
   - ○ [136-321 PPH (CRES)
   - □ [112 501 PPH (CRES)
7. RUBBER STAMP BLACK USING .12 HIGH LETTERS, THE FOLLOWING INFORMATION APPLIES WHERE SHOWN

	STAMP
FOR -001,	J9
FOR -002,	J10
FOR -003,	J11

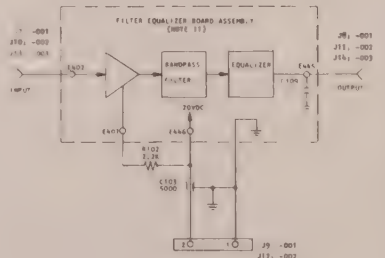
8. RUBBER STAMP BLACK USING .12 HIGH LETTERS, THE FOLLOWING INFORMATION APPLIES WHERE SHOWN

	STAMP
FOR -001,	J9
FOR -002,	J11
FOR -003,	J13

9. ON -001 AND -002, DRESS CABLE OPPOSITE FROM SHOWN. DIM A WILL THEN BE TAKEN FROM OPP SURFACE SHOWN.

FOR DETAILED FILTER EQUALIZER SCHEMATIC, SEE ASSEMBLY PART NUMBERS

-001, 636-8287-001
-002, 640-5659-001
-003, 640-5660-001



SCHEMATIC

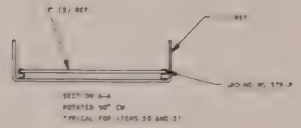
REVISIONS								
					LTR	DESCRIPTION	DATE	APVD
					A	J-55350 ADD ITEM 3	3-7-78	

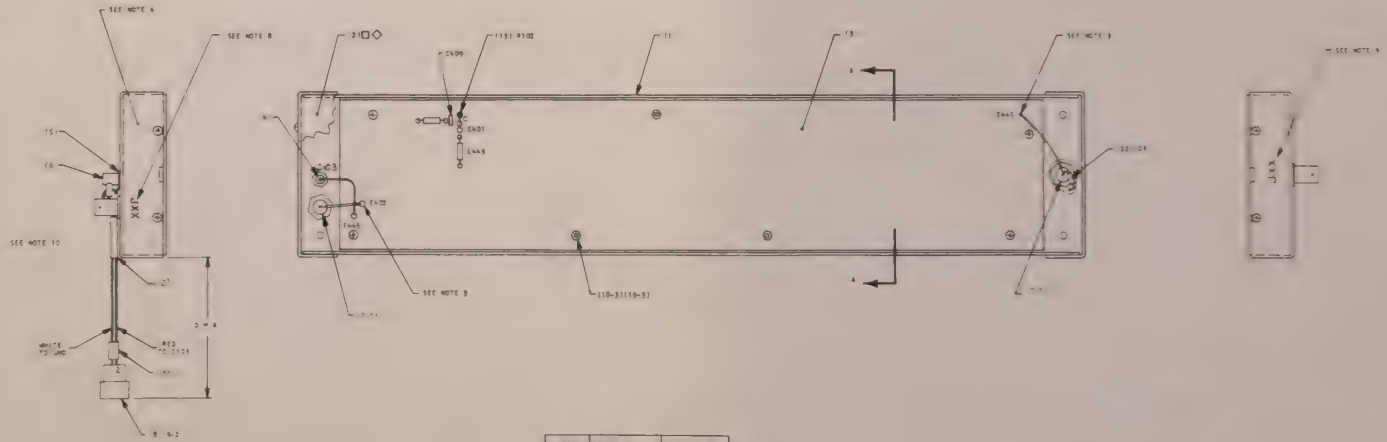
QTY	QTY	QTY	ITEM NO	PART OR IDENTIFYING NO	NOMEN- CLATURE OR DESCRIPTION	REV ACTN LTR	DATE	UNUSED	NOTE	REF DESIGNATN
1.0	1.0	1.0	23	104 1196 000	LUG SOLDER					
1.0	1.0	1.0	22	916 0070 000	CAP .1 PF					C106
2.0	2.0	2.0	21	636-6430-001	SPRING GROUNDING					
2.0	2.0	2.0	20	636-6430-004	SPRING GROUNDING					
3.0	3.0	3.0	19	112 0004 000	STUD 112 SD					
3.0	3.0	3.0	18	540-9063 001	POST HEX 6B					
0.5	0.5	0.5	17	499-7051-000	WIRE 22 GA WHT		02			
0.5	0.5	0.5	16	499-7068 000	WIRE 22 GA RED		02			
0.4	0.4	0.4	15	428-4823-000	WIRE BUS 24 GA		02			
			14							
1.0	1.0	1.0	13	745 0910-330	RESISTOR 2.2K OHMS					R102
0.1	0.1	0.1	12	152-1371 000	SLEEVING		02			
1.0			11	152 6591 350	MARKER CABLE J15					
	1.0		11	152-6591-320	MARKER CABLE J13					
		1.0	11	152-6591-690	MARKER CABLE J9					
			10							
2.0	2.0	3.0	9	372-0022-010	PINS CONN					
1.0	1.0	1.0	8	372 5006 180	HOUSING CONN					
2.0	2.0	2.0	7	357-2523 030	CONN					
1.0	1.0	1.0	6	636-6475-001	BOOT TERMINAL					
1.0	1.0	1.0	5	104 0196 000	LUG, SOLDER					
1.0	1.0	1.0	4	741 5002-010	CAP 5000 PF					C104
1.0			3	640-5660-001	ASSY, FILTER EQUALIZER 30 MHZ BW					
	1.0		3	640-5659-001	ASSY, FILTER EQUALIZER 30 MHZ BW					
		1.0	1	636-8287-001	ASSY, FILTER EQUALIZER 60 MHZ BW					
1.0	1.0	1.0	2	640-2801-001	COVER, TOP					
1.0	1.0	1.0	1	640-2849 001	CHASSIS					
QTY	QTY	QTY	ITEM NO	PART OR IDENTIFYING NO	NOMEN- CLATURE OR DESCRIPTION	REV ACTN LTR	DATE	UNUSED	NOTE	REF DESIGNATN
001	002	003	DASH NO	PARTS LIST ITEM CUSTOMARY MEASUREMENT						

MATERIAL: NONE	UNLESS OTHERWISE SPECIFIED: DUAL DIMENSIONED: DWGS ARE IN MILLIMETERS [INCHES]. SINGLE DIMENSIONED: DWGS ARE IN INCHES. METRIC / US CUSTOMARY [ ]	CONTRACT NO	ROCKWELL INTERNATIONAL CORPORATION COLLINS RADIO GROUP
FINISH: NONE	TOL ON METRIC DIM: X = ±0.5 XX = ±0.25 HOLE DIAMETERS UNDER 6.35 P = +0.13 -0.13; 6.35 TO 12.7 P = +0.15 -0.13; OVER 12.7 P = +0.20 -0.13; ANGLES ±1° ECCENTRICITY BETWEEN DIAMETERS ON AN AXIS NOT TO EXCEED 0.38 P. PART SHALL CONFORM TO ANSI Y14.5 PROJECTION	PREP / MEYER 3-7-78; CHK / OWNER 3-9-78; APVD / [illegible] 3-13-78; QUAL / [illegible] 3-13-78; MFG / [illegible] 3-13-78; ENGR / [illegible] 3-13-78	FILTER EQUALIZER ASSY
	TOL ON US CUSTOMARY DIM: .XXX = ± .010 .XX = ± .020 HOLE DIAMETERS UNDER .250 P = +.005 -.005; .250 TO .500 P = +.005 -.005; OVER .500 P = +.008 -.005; ANGLES ±1° ECCENTRICITY BETWEEN DIAMETERS ON AN AXIS NOT TO EXCEED .010 P. THIRD ANGLE PROJECTION	SIZE D	DWG NO 13499
		SCALE	SHEET 1 OF 2

NOTICE: THIS TECHNICAL DATA IS PROPRIETARY TO ROCKWELL INTERNATIONAL COLLINS RADIO GROUP. IT SHALL NOT BE USED, REPRODUCED OR DISCLOSED IN WHOLE OR IN PART TO ANYONE OUTSIDE ROCKWELL INTERNATIONAL COLLINS RADIO GROUP.

KEY STATUS OF SHEETS	REV	A
	SHEET	1





-003	32 MHZ BW	30.1 TO 33.
002	30 MHZ BW	28 TO 32.
-001	20 MHZ BW	19.7 TO 20.3
DASH NO	TITLE MODIFIER	DASH A

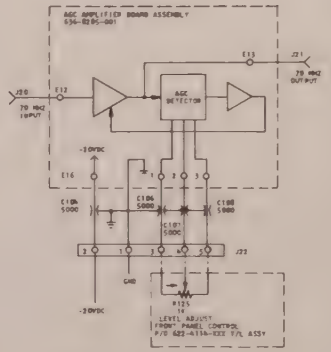
ROCKWELL INTERNATIONAL CORPORATION
COLLINS DIVISIONS

PREP		
CHG		

SIZE	13499	REV
		SHEET

NOTES

1. CABLE CLAMP, ITEM 10, LOCATED ON OUTSIDE OF CHASSIS, WILL BE PERMANENTLY ATTACHED AT A HIGHER ASSEMBLY LEVEL. TEMPORARY ATTACHMENT WITH APPROPRIATE HARDWARE IS PERMISSIBLE, IF REQUIRED.
2. RUBBER STAMP BLACK USING .12 HIGH LETTERS, DESIGNATORS J20 AND J21 APPROX AS SHOWN ON CHASSIS, ITEM 1.
3. REMOVE EXISTING PIN/SOCKET AT E13 AND E12 BEFORE CONNECTING WIRES.
4. UNLESS OTHERWISE SPECIFIED
   ALL RESISTANCE VALUES IN OHMS.
   ALL CAPACITANCE VALUES IN PICOFARADS.
5. THE AGC AMPLIFIER ASSEMBLY, ITEM 5 IS BUILT WITH R125, MOUNTED ON THE BOARD. THIS VARIABLE RESISTOR SHOULD BE CAREFULLY REMOVED FROM THE ASSEMBLY AND DISCARDED. THE ORIGINAL VARIABLE RESISTOR MOUNTING HOLES IN THE BOARD ASSEMBLY ARE THEN WIRED TO FEEDTHRU CAPACITORS, C108, C107, AND C108.
6. MARK ASSY PER 627-9954-001 APPROX WHERE SHOWN
7. USE STANDARD SHRINK-SLEEVING TERMINATIONS AT COAX CONNECTIONS.
8. UNLESS OTHERWISE SPECIFIED ALL HARDWARE TO BE DEFINED AS FOLLOWS
   C (.138-32) (CRES)
   D (.112-40) (CRES)
9. KEEP WIRE LENGTH TO MINIMUM WHERE INDICATED.
10. USE BUS WIRE, ITEM 15, WHERE NO WIRE CODE OR COLOR IS SPECIFIED.
11. PARENTHETICAL ITEM IDENT DENOTES: (ITEM NO.-QTY).
12. TESTING OF COMPLETED ASSEMBLY IS DONE AT A HIGHER TOP LEVEL ASSEMBLY.



SCHEMATIC

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	REF DES	MFR CODE
1	1	634-6435-005	SMA MC GROUND MC		
2	1	634-6453-006	SMA MC GROUND MC		
3	1	634-6495-002	SMA MC GROUND MC		
4	1	634-6495-004	SMA MC GROUND MC		
5	1	532-6454-001	MARKER CABLE J22		
		J22			
2	1	495-7142-006	6" MC 22 GA SMA*	J22	
2	1	495-7274-006	6" MC 22 GA BLUE	J22	
2	1	495-7048-006	6" MC 22 GA RED	J22	
2	1	495-7047-006	6" MC 22 GA BLK	J22	
2	1	495-7271-006	6" MC 22 GA WHT	J22	
5	1	428-0023-006	CABLE ASSY	J22	
5	1	428-6021-006	6" MC BNC 26 GA	J22	
5	1	532-2454-001	CABLE MC TEST ON	J22	
5	1	532-8484-001	CABLE MC SMA-MC	J22	
5	2	532-7001	CABLE MC	J22	
5	2	304-1[illegible]-006	MC SOLDER		
5	1	454-7463-006	CABLE ASSY		
5	8	372-0022-011	CONN F MC		
5	8	372-6484-2[illegible]	CONN MC/F MC J22		
2	1	495-7523-011	CONN J21		
4	5	634-6475-006	BODY TERM BNC		
4	5	304-[illegible]-006	MC SOLDER		
4	5	24-6002-011	CAP CONN MC		
1	3	634-8285-001	ASSY AGC AMP		
1	2	640-2401-006	COVER TOP		
1	1	640-2005-008	CHASSIS		

QTY	REF NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	REV	MFR CODE

REVISIONS			
LTR	DESCRIPTION	DATE	APPVD

MATERIAL	NONE
FINISH	NONE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS. TOLERANCES ARE: METRIC: TOL ON METRIC DIM X = ±0.1, XX = ±0.05, HOLE DIAMETERS: UNDER 6.35 P = ±0.13, 6.35 TO 12.7 P = ±0.15, OVER 12.7 P = ±0.25; ANGLES ±1°; ECCENTRICITY BETWEEN DIAMETERS ON. INCHES: TOL ON DIM .X = ±.005, .XX = ±.010, HOLE DIAMETERS: UNDER .25 P = ±.005, .25 TO 500 P = ±.010, OVER .500 P = ±.020; ANGLES ±1°; ECCENTRICITY BETWEEN DIAMETERS ON.

CONTRACT NO.	
DRWN	M. KEYES
CHK	J. DORNEY
APVD	R. [illegible]
MFG	[illegible]
ENGR	J. A. [illegible]

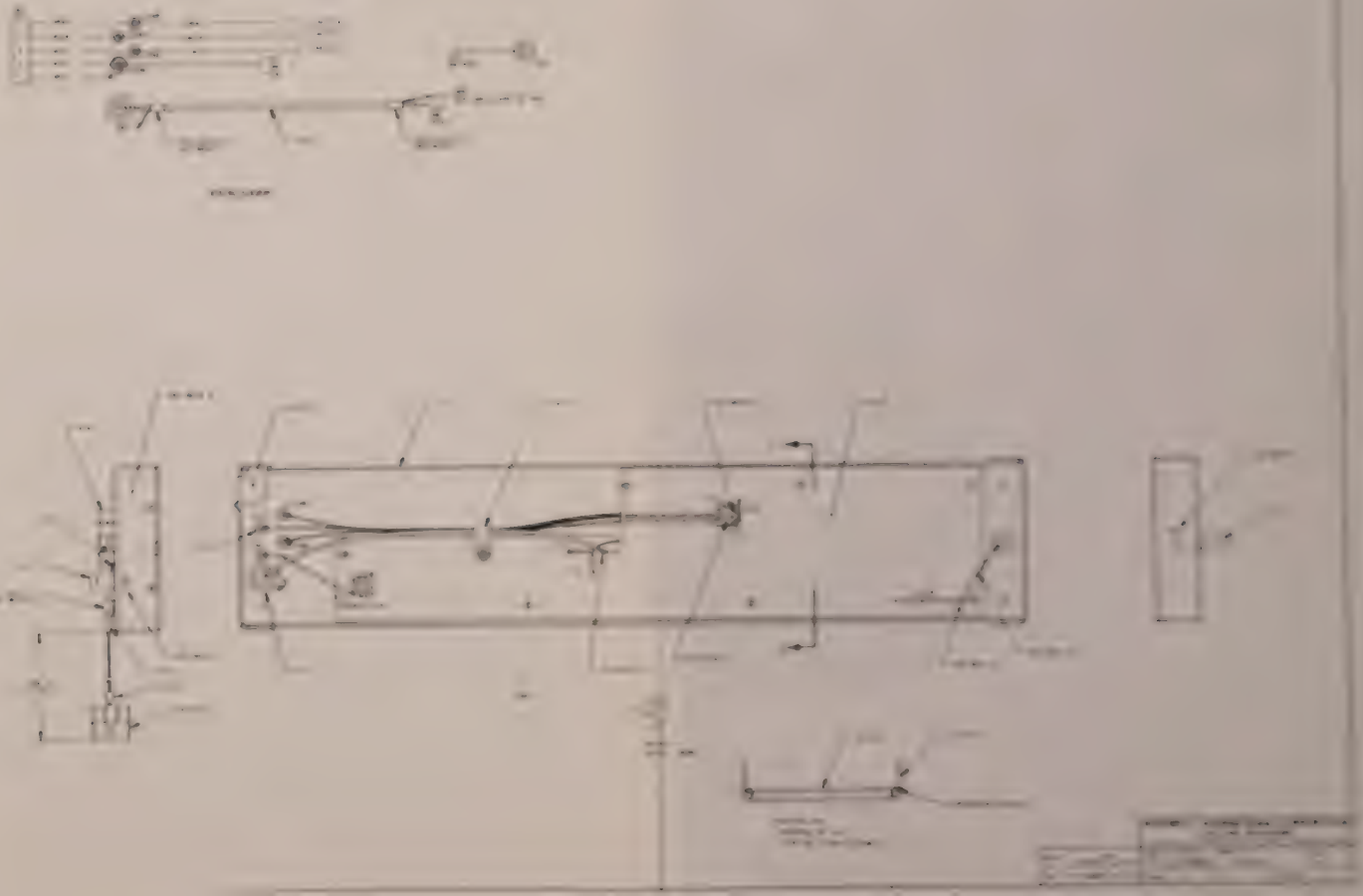
ROCKWELL INTERNATIONAL CORPORATION
COLLINS RADIO GROUP
DALLAS, TEXAS

AGC AMP, F ER ASSEMBLY

SIZE D | 13499 | REV

SCALE

NOTICE: THIS TECHNICAL DATA IS PROPRIETARY TO COLLINS RADIO GROUP IT SHALL NOT WITHOUT WRITTEN AUTHORIZATION



NOTES

1. PARENTHETICAL ITEM IDENT DENOTES ITEM USED ON -07 ASSY.
2. MARK ASSEMBLY PER 627-9359-000
3. MAXIMUM COMPONENT HEIGHT IS 1.2 INCHES EXCEPT FOR LONGITUDIAL STRIP OF 3 INCHES WIDE DOWN THE CENTER OF THE MODULE IN THIS AREA MAXIMUM COMPONENT HEIGHT IS .75 INCHES
4. UNLESS OTHERWISE SPECIFIED
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROFARADS
   ALL INDUCTANCE VALUES ARE IN MILLIHENRIES
5. UNUSED HOLES NEED NOT BE FILLED WITH SOLDER
6. 10% CARBON COMPOSITION RESISTORS MAY BE SUBSTITUTED IF NECESSARY FOR 5% CARBON FILM RESISTORS
7. INSTALL ITEM 70 FROM COMPONENT SIDE OF BOARD
8. MOUNT ALL COMPONENTS ON BOARD SUCH THAT LEADS ARE OF MINIMUM LENGTH
9. INSTALL ITEMS 14 AND 15 SUCH THAT TERMINAL MARKED WITH ARROW IS PLACED IN HOLE INDICATED BY ARROW ON LAYOUT
10. C73 CONNECTS FROM L17 TO GROUND
    C74 CONNECTS FROM E1 TO GROUND
11. INSTALL ITEM 81 FROM BACK SIDE OF BOARD
12. L18 AND L19 MAY BE CHANGED IN UNIT TEST USING TEST SELECT KIT, ITEM 88
13. R11 MAY BE CHANGED IN UNIT TEST USING TEST SELECT KIT, ITEM 89
14. R105 MAY BE CHANGED IN UNIT TEST USING TEST SELECT KIT, ITEM 90
15. MOUNT Q5, Q8, Q11, Q14, Q17 SO THAT MAXIMUM HEIGHT FROM TOP OF BOARD TO BOTTOM SURFACE OF TRANSISTOR BODY IS NOT EXCEED .7 INCHES
16. MOUNT ITEM 24 ON BASE LEADS OF Q6, Q9, Q12, Q15, AND Q18 MOUNT TRANSISTORS AS CLOSE TO BOARD AS POSSIBLE

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APVD
		J 51390 REWORK PER BOARD		
		J 54317 CHG ITEM 82		
		J-59091 CHG ITEM 68 ADD 67		
		J-59091 CHG ITEM 22 ADD ITEM 31		
		J-51965 REV FAB BD ADD TAPE TO BEEFSTAKE BDS		
		J-52100 CHG ITEM 81		
		J-52295 CHG ITEMS 28 & 88		
		J-52875 CHG ITEM 73		

ITEM NO.	QTY	PART OR IDENT NO.	NAME	DESCRIPTION	REF DES	ALTN PREF	USE CODE	NOTES	REVISION LTR	DESIGNATOR
		001 DASH NO		PARTS LIST (US CUSTOMARY MEASUREMENTS ONLY)						
	1.0	80	633-8800-003	KIT	RES TEST SEL			14		
	0	89	633 8800 002	KIT	RES TEST SEL			13		
	1.0	00	639-7363-001	KIT	IDCTR TEST SEL			12		
	2.0	81	240-2014-000	IDCTR	18UH			12	P	L18,L19
	1.0	86	184-9102-100	CAP	6.8				P	*66
	1.0	85	242-0433-050	IDCTR	VAR 33				P	L14
	13.0	84	352-1706-010	RSTR	680		101	15,16	R	Q5,Q6,Q8,Q9,Q11,Q12,Q14,Q15,Q17,Q18
	7.0	83	705-1002-000	RES	1.33K				P	R42 R5 R78 R96 R115, R112 R119
	31.0	82	913-5019-240	CAP	4700 PF			10	R	C19,C7,C19,C20,C21,C25 C27,C36,C37-C39,C38,C40-C43,C46,C48-C50,C52,C53, C61,C62,C65, C67,C68, C72,C73,C76,
	2.0	81	360-0079-340	CONTACT	ELECTRICAL			11		E12,E21
	1.0	80	705-6569-000	RES	374				P	R45
	1.0	79	745-4020-930	RES	154				P	R23
	1.0	78	705-0990-000	RES	750				R	R16
	1.0	77	705-1108-000	RES	21.5K			16	R	R105
	1.0	76	352-0550-000	TRANSISTOR	2N2905A				R	Q20
	2.0	75	714-3264-050	THERMISTOR	100				R	RT2,RT1
	4.0	74	288-2154-000	SHPPRES	PARASITIC			16		E101-E105
	1.0	73	636-4458-001	BOARD	FAB					
	3.0	72	16-7032-010	PINS	ROUND				R	E13,E33,E24
	3.0	71	367-1508-010	CLIP	(50 PIN)				R	S2,S3,S4
	6.0	70	332-0024-010	PIN	50			7	R	E1-E2, E4-E7
	1.0	69	182-0027-090	RES	VAR 5K				R	R18
	1.0	68	182-0027-110	RES	VAR 20K				P	*69
	1.0	67	382-1400-080	RES	VAR 20K				R	R20
	1.0	66	382-1405-050	RES	VAR 2K				R	R24
	1.0	65	382-0027-070	RES	VAR 1K				R	R125
	1.0	64	705-1066-000	RES	28.7K				P	R118
	1.0	63	382-0027-030	RES	VAR 50				R	R39
	1.0	62	705-1024-000	RES	1.82K				R	R34
	4.0	61	745-0910-810	RES	6.7K				R	R90, R91, R124, R126
	1.0	60	745-0910-720	RES	2.0K				R	R19
	1.0	59	745-0910-710	RES	1.8K				R	R29
	▲	58								
	1.0	57	745-0910-450	RES	150				P	R123
	2.0	56	705-1048-000	RES	12.1K				P	R131, R132
	1.0	55	745-0910-430	RES	120				P	R152
	4.0	54	745-0910-210	RES	15				R	R56, R77, R96, R109
	4.0	53	745-0910-370	RES	68				R	R48, R65, R84, R120
	4.0	52	745-0910-270	RES	27				R	R35, R55, R72, R73, R71
	4.0	51	745-0910-330	RES	47				R	R31, R58, R75, R93
	1.0	50	745-0910-290	RES	33				R	R107
	1.0	49	745-0914-490	RES	820				R	R 77
	4.0	48	745-0914-530	RES	330				P	R44 R66 R83 R101
	4.0	47	745-0910-630	RES	820				R	R18 R47 R64 R82 R100 R119
	1.0	46	745-0910-350	RES	56				R	R83, R60, R79, R97, R110
	3.0	45	745-0910-650	RES	1K				R	R12, R13, R92
	1.0	44	705-0978-000	RES	422				P	R57
	1.0	43	705-0930-000	RES	42.2				R	R21
	1.0	42	705-0951-000	RES	115				P	R59
	1.0	41	705-0961-000	RES	187				P	R30
	1.0	40	705-0967-000	RES	154				P	R128
	1.0	39	705-0919-000	RES	34.9				P	R127
	1.0	38	705-0940-000	RES	68.1				R	R122
	1.0	37	705-1084-000	RES	68.1K				R	R99
	12.0	36	705-1017-000	RES	2.74K				R	R55,R5,R53,R67,R68,R72, R85,R86,R88,R103,R104, R106
	1.0	35	745-1059-000	RES	30.5K			13	R	R117
	1.0	34	705-1084-000	RES	10.0K				R	R113
	1.0	33	744-0910-370	RES	536				R	R17
	1.0	32	705-0951-000	RES	115.3K				R	R52
	1.0	31	913-3279-290	CAP	2.2 UF				R	C24
	1.0	30	705-0998-030	RES	909				R	R130
	▲	29								R126
	4.0	28	705-0975-000	RES	365				R	R94 R63 R81 R99
	4.0	27	705-1013-000	RES	2.15K				R	R64 R62 R80 R98 R116
		26								
	4.0	25	745-4468-000	RES	261				R	R40 R59 R76 R90 R108
	1.0	24	705-1011-000	RES	2.32K				R	R3
	1.0	23	184-9137-160	CAP	150 UF				R	C51
	2.0	22	184-9122-370	CAP	2.2 UF				R	C59, C64
	1.0	21	916-0145-000	CAP	3 PF				R	C63
	1.0	20	912-3838-000	CAP	12 PF				R	C57
	1.0	19	912-3842-000	CAP	22 PF				R	C58
	3.0	18	912-3871-000	CAP	82 PF				R	C32,C29,C37
	5.0	17	912-3839-000	CAP	15 PF				R	C18,C26,C31,C39,C47
	1.0	16	912-3861-000	CAP	56 PF				R	C45
	2.0	15	917-1225-000	CAP	VAR 9.0-35 PF			9	R	C44,C55,
	3.0	14	917 1222 000	CAP	VAR 5 5-18 PF			9	R	C16,C54,C50
	2.0	13	353-3756-020	DIODE	MA4T232				R	CR11,CR12
	1.0	12	242-0435-130	IDCTR	VAR 082				R	L17
	1.0	11	242-0433-020	IDCTR	VAR 46A				R	L12
	1.0	10	242 0433-050	IDCTR	VAR 33A				R	L11
	10.0	9	240-5801-000	IDCTR	10.0M				R	L4,L5, L6, L7, L15, L16
	1.0	8	816-5161-003	EPND					R	E9
	1.0	7	351-1029-020	FET	2N4416				R	Q2
	2.0	6	353-2938-010	D DIDE	DET4220C				R	Q22,Q23
	1.0	5	353-3691-010	D DIDE	MV2109				R	CR13
	6.0	4	922-6-18-010	DIODES	MA4161				R	CR5-CR10
	2.0	3	35-1027-070	IC	MC 4558				R	U1,U3
	10.0	2	352-0548-010	RSTR	PWR CIRC		102	15 16	R	R5,R6,R8,R9,R11,R17,R14, R15,R17,R18
	5.0	1	352-0764-010	RSTR	2N6109				R	Q7,Q10,Q13,Q16,Q19

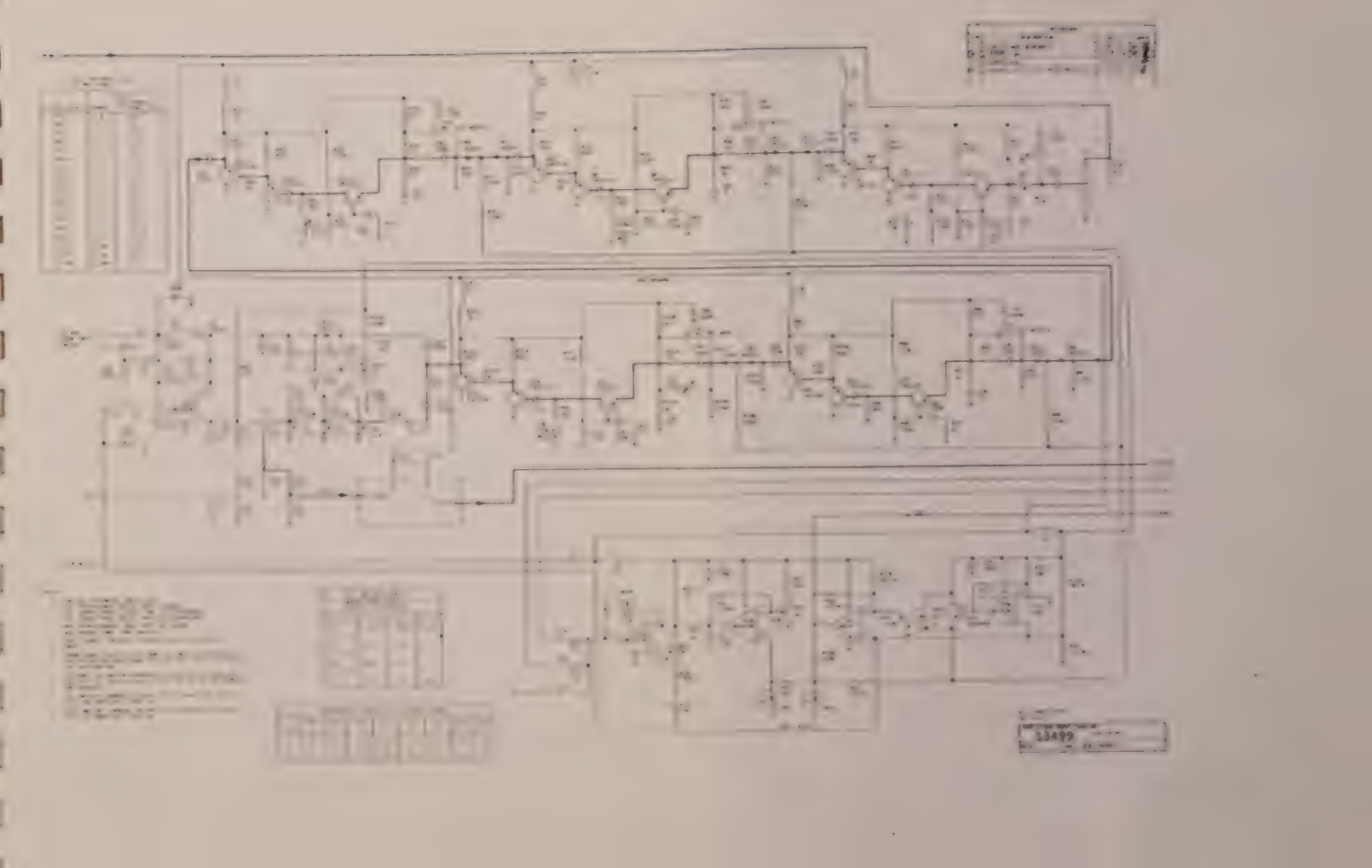
QTY	QTY	QTY	QTY	ITEM NO.	PART OR IDENT NO.	NAME	DESCRIPTION	REF DES	ALTN PREF	USE CODE	NOTES	REVISION LTR	DESIGNATOR
				001	DASH NO		PARTS LIST (US CUSTOMARY MEASUREMENTS ONLY)						

NOTICE: THIS TECHNICAL DATA IS PROPRIETARY TO COLLINS RADIO COMPANY. IT SHALL NOT, WITHOUT WRITTEN AUTHORIZATION BE USED, RELEASED, OR DISCLOSED IN WHOLE OR IN PART, TO PARTIES OUTSIDE COLLINS RADIO COMPANY.

DIMENSIONS ARE IN MILLIMETERS [INCHES]
TOL ON METRIC DIM .5 = ±.8 mm XX = ±.20

CONTRACT NO	ROCKWELL INTERNATIONAL CORPORATION COLLINS RADIO GROUP
	DALLAS, TEXAS
PREP'D BY: R. CRYE 2-12-75	AGC AMPLIFIER
CHK'D: J. FASSETT 2-12-75	
APVD: C. CUNNINGHAM 2-12-75	SIZE: D — CODE IDENT: 04213 — DWG NO: D13499 — REV: 696 B2M
APVD: W. PETERSON 2-12-75	SCALE: NONE — SHEET 1 OF 3
APVD: F. FISHER 2-12-75	

D 13499 A36 R2B1



NOTES:
1. PARENTHETICAL ITEM IDENT DENOTES ITEM FIND NO - QTY!
2. MARK ASSEMBLY PER 637-9959-000
3. MAXIMUM COMPONENT HEIGHT IS 17.3MM[0.701INCHES EXCEPT FOR LONGITUDAL STRIP 0.3 INCHES WIDE DOWN THE CENTER OF THE MODULE. IN THIS AREA MAXIMUM COMPONENT HEIGHT IS 15.3MM[0.6]INCHES
4. INSTALL INSULATOR ITEM 28, UNDER QA01, ITEM 1
5. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROFARADS
   ALL INDUCTANCE VALUES ARE IN MILLIHENRIES
   UNUSED HOLES NEED NOT BE FILLED WITH SOLDER
6. 10% CARBON COMPOSITION RESISTORS MAY BE SUBSTITUTED IF PRECISION FOR 5% CARBON FILM RESISTORS.
7. INSTALL ITEM 37 FROM COMPONENT SIDE OF BOARD
8. MOUNT ALL COMPONENTS ON BOARD SUCH THAT LEADS ARE OF MINIMUM LENGTH
9. INSTALL ITEM 40 - 49 SUCH THAT TERMINAL MARKED WITH ARROW IS PLACED IN HOLE INDICATED BY ARROW ON LAYOUT
10. LA11,LA16,LA21,LA25,LA31,LA36 LA49 LA50,LA51,LA52 LA53 AND LA54 ARE PRINTED CIRCUIT INDUCTORS
11. INSTALL ITEM 65 FROM BACK SIDE OF BOARD.
13. INSTALL BUS WIRE ITEM 62 BETWEEN PADS AS SHOWN
14. MOUNT ITEM 40 TO BASE OF QA10 (ITEM 1)

QTY	QTY	QTY	ITEM NO.	PART OR IDENTIFYING NO.	NAME	DESCRIPTION	REV ALTN CHG PREF	MFR	MFR	NOTES	REF DESIGNATION
				*4	114-3284-030	THMPTR	30"				A14A1
			2		440-0424-110	IDCTR	.438				A40A
			17	7	912-0118-000	CAP	5				C471,C481,C491
					916-0139-000	CAP	8				C461
				5	916-0137-000	CAP	10 PF				C501
			69		242-0433-050	IDCTR	.23				L499
			69		242-0424-090	IDCTR	.12				L413,L423
			2	2	240-1568-000	IDCTR	1.0				L443-L463
		A	66								
			6	65	360-0075-340	CONTACT	ELECTR CAL				W66,W67,W91,C49
			16	64	367-1508-010	CLIP	STRAPS-WC				SA1,SA2 W
				63							
			2	62	431-2220-000	WIRE	BUS				
			1	61	916-0070-000	CAP	.1 MF				C428
			1	60	916-0021-000	CAP	.1 MF				C425
			1	59	184-9102-930	CAP	.1				
		A	58								
			4	57	917-1225-000	CAP	9-35				C444 C43 C45 C48 C46
											C478 C47 C49 C495 C495
											C495,C508,C509
			7	56	912-3874-000	CAP	82				C456 C486 C487 C457,C468,
											45 C44 C47 C46 C48
											C470,C46,C49
		A	55								
			10	54	917-1218-000	CAP	2-8			10	C418,C421, C448
											C416, C422, C463,C47
											C483,C482,C503,C49
		A	53								
			1	52	916-0670-000	CAP	33				C432,C434
		A	51								
			1	50	916-0329-000	CAP					
			14	49	917-1222-000	CAP	5-18				C4 C4 C42 C C46
											C479,C480,C490,C500,C430
											A28
			10	48	917-1218-000	CAP	2-8			10	C418,C421, C448
											C416, C422, C463,C47
											C483,C482,C503,C49
			20	47	242-0424-040	IDCTR	.10				L428, L4
			7	46	242-0424-140	IDCTR	.66				L406
			96	45	242-0424-100	IDCTR	.33				L4,L42,L425 L44 L434 L439
			1	44	242-0433-10	IDCTR	.26				L4
			1	43							
			1	42	242-0424-090	IDCTR	.27				L4
			1	41	242-0433-090	IDCTR	.1				L421
			2	40	288-3154-000	SUPPR	PARASITIC				R487
			30	39	242-0424-150	IDCTR	.83				L404
				38							
				37							
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				2							
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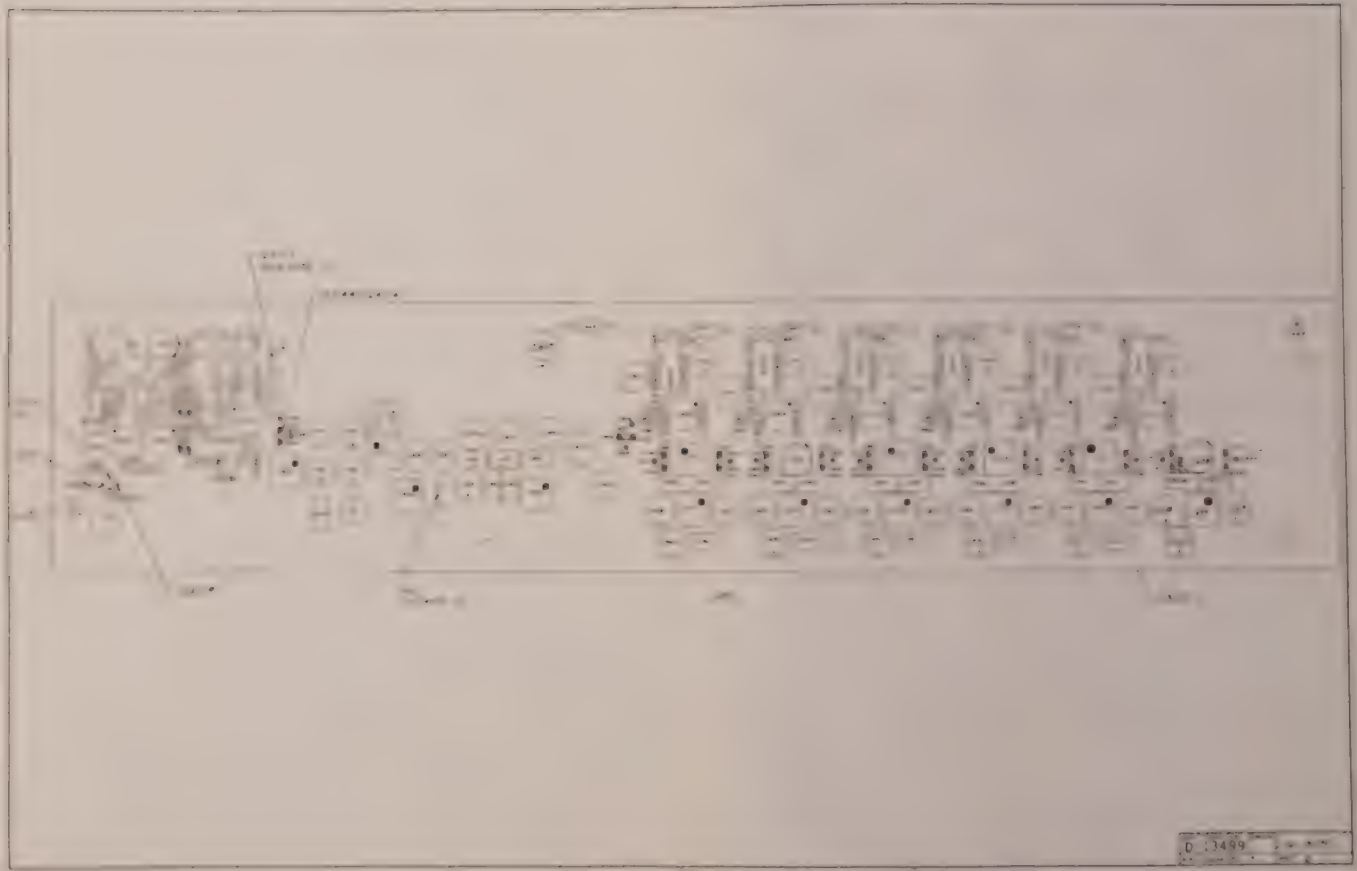
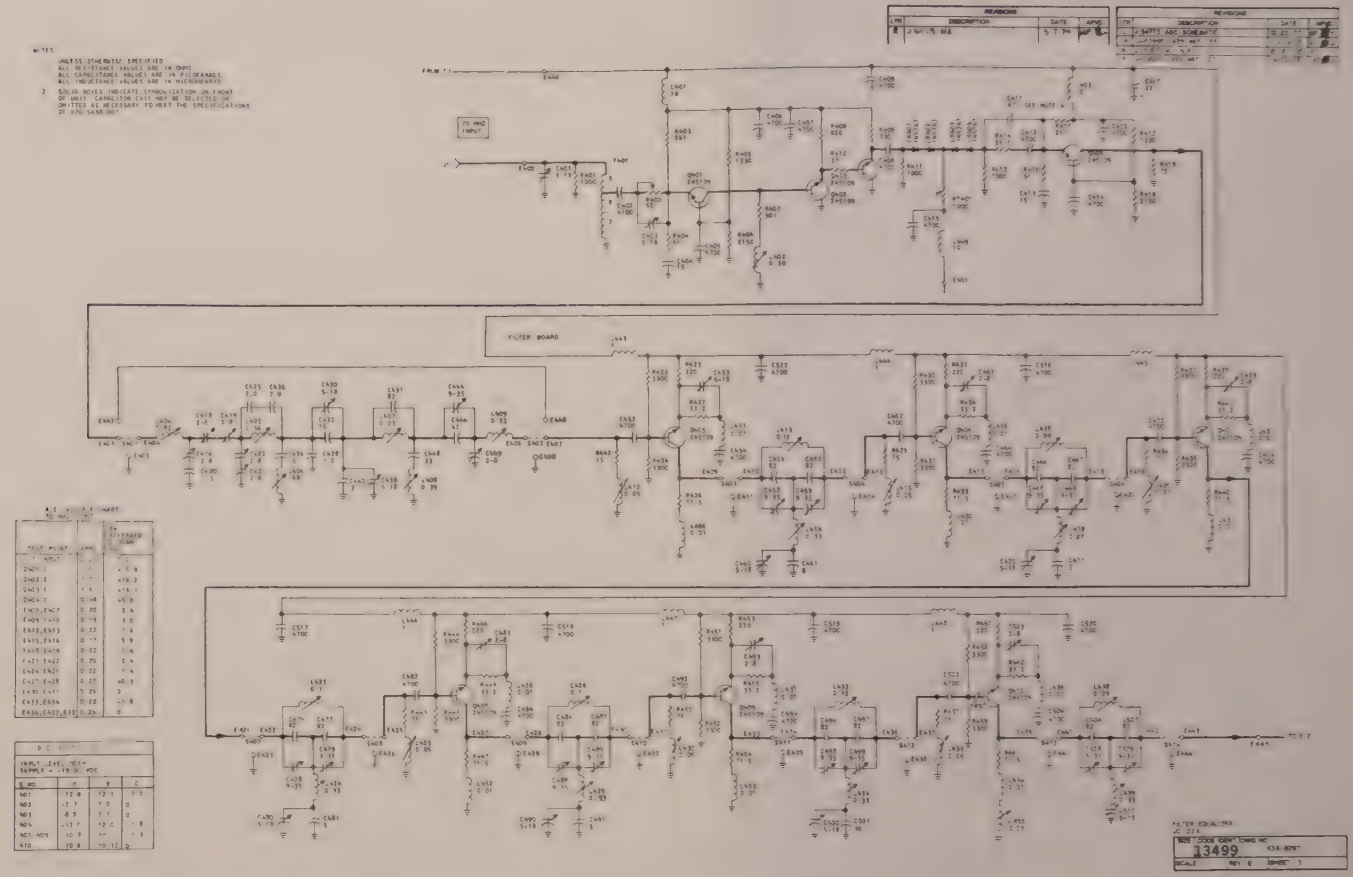
				DASH NO		PARTS LIST NUS CUSTOMARY REQUIREMENTS ONLY!					

REVISIONS			
	DESCRIPTION	DATE	APPV

| | | | | | | | | | | |




NOTES
UNLESS OTHERWISE SPECIFIED
ALL RESISTANCE VALUES ARE IN OHMS
ALL CAPACITANCE VALUES ARE IN PICOFARADS
ALL INDUCTANCE VALUES ARE IN MICROHENRYS
2 SOLID BOXES INDICATE SYMBOLIZATION ON FRONT OF UNIT. CAPACITOR CA11 MAY BE SELECTED OR OMITTED AS NECESSARY TO MEET THE SPECIFICATIONS OF 670-5658-001
70 MHZ INPUT
FILTER BOARD
FILTER EQUALIZER
13499

NOTES:
1. PARENTHETICAL ITEM IDENT DENOTES (ITEM NO.-QTY).
2. MARK ASSEMBLY PER 607-9334-001.
3. MAX COMPONENT HEIGHT IS 0.2 (MIN) TO 20 (INCHES) EXCEPT FOR LONG LEADS WHICH ARE LIMITED TO 0.1 (MIN) TO 0.5 (MAX) FROM THE INSIDE SURFACE OF THE BOARD AS MEASURED FROM COMPONENT HEIGHT AS A % (MIN) TO ALLOWED.
4. INSTALL VARISTOR ITEM 29, UNDER DW01, ITEM 1.
5. INSERT THRU-W SPEC FITS.
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN PICOFARADS
   ALL INDUCTANCE VALUES ARE IN MICROHENRIES
6. INSERT HOLE NEED NOT BE FILLED WITH SOLDER
7. 10% CARBON COMPOSITION RESISTORS MAY BE SUBSTITUTED, IF NECESSARY FOR 5% CARBON FILM RESISTORS
8. INSTALL ITEM 28 FROM COMPONENT SIDE OF BOARD.
9. MOUNT ALL COMPONENTS ON BOARD SUCH THAT LEADS ARE OF MINIMUM LENGTH
10. INSTALL ITEM 40,49 AND 87, SUCH THAT TERMINAL MARKED WITH ARROW IS PLACED IN HOLE INDICATED BY ARROW ON DWG.
11. INSTALL ITEM 65 FROM BACK SIDE OF BOARD.
12. INSTALL BUS WIRE, ITEM 62, BETWEEN PADS AS SHOWN.
13. MOUNT ITEM 90 TO BASE LEAD OF Q810 (ITEM 2), AND ITEM 40 TO COLLECTOR LEAD OF Q405 (ITEM 2).
14. INSTALL BUS WIRE, ITEM 79, BETWEEN PADS AS SHOWN.

QTY	QTY	QTY	ITEM NO	PART ID IDENTIFYING NO	NAME	DESCRIPTION	REV LTR	ALTN PREF	LINE NBR	NOTES	REF DES	DESIGNATOR
			0.5	421-2220-000	WIRE	BUS, #26A				14		
			6.0	705-1454-120	RES	2K					R	R462,R479,R436,R483,
											R	R450,R457
			▲								▲	
			1.0	714-3264-050	THMSTR	1000					R	RT401
			1.0	242-0424-130	IDCTR	56					R	L408
			8.0	302-0023-010	RES	10 VAR					R	R464,R466,R468,R470,R472,R474
			1.0	242-0433-040	IDCTR	18					R	L439
			1.0	242-0424-050	IDCTR	12					R	L418
			6.0	240-1568-000	IDCTR	1.0					R	L443 L448
			2.0	360-0079-340	CONTACT	ELECTRICAL				11	P	E401,E445
			1▲.0	367-1508-010	CLIP	STRAPPING						
			0.2	421-1820-000	WIRE	BUS, #26A				12		
			▲									
			1.0	184-9102-430	CAP	22 UF					R	C417
			4.0	917-1225-000	CAP	3-35				10	R	C416 C430 C425 C420
			8.0	912-3852-000	CAP	47					R	C456 C486 C476 C486
											R	C484 C506
			1.0	912-3847-000	CAP	30					R	C422
			1.0	916-0681-000	CAP	2-					R	C423
			1.0	916-0670-000	CAP	15					R	C418
			▲									
			1.0	916-0132-000	CAP	10					R	C415
			4.0	917-1222-000	CAP	1.18					R	C401 C403,C421
											R	C411 C498 C499
			16.0	917-1218-000	CAP	2.0				10	R	C458 C451 C461 C468 C484
										10	R	C473,C474 C479 C491
											R	C497 C494 C493 C503
											R	C509 C505 426
			1.0	242-0424-060	IDCTR	15					R	L421
			1.0	242-0424-160	IDCTR	1.0					R	L406
			2.0	242-0424-100	IDCTR	33					R	L429 L434
			4.0	242-0424-090	IDCTR	27					R	L414, L439, L418, L424

PARTS LIST IS CUSTOMARY MEASUREMENTS ONLY!

QTY	QTY	QTY	ITEM NO	PART OR IDENTIFYING NO	NAME	DESCRIPTION	REV LTR	ALTN PREF	LINE NBR	NOTES	REF DES	DESIGNATOR
			1.0	242-0433-120	IDCTR	082						
			2.0	280-2154-000	SUPPR	KA4A7						
			1.0	242-0424-110	IDCTR	39						
			2.0	242-0424-070	IDCTR	2						
			9.0	242-0433-020	IDCTR	068						
			38.1	971-5019-640	CAP	470						
			1.	705-0942-000	RES	75						
			6.0	705-3185-480	RES	5						
			6.0	765-1324-000	RES	237						
			6.0	705-3185-860	RES	33.2						
			12.0	765-2910-720	RES	3.M						
			1.0	330-0120-010	PIN	8 NC						
			1.0	352-3438-000	NUT	4-40						
			44.0	331-0424-10	PIN	50						
			1.0	279-1100-03	RES	50 VAR						
			1.0	765-0961-290	RES	1						
			1.0	765-0961-453	RES	43						
			2.0	765-0961-523	RES	82						
			2.0	765-0961-353	RES	53						
			1.0	765-0961-651	RES	19						
			3.0	705-9920-000	RES	21						
			2.0	705-9946-000	RES	10K						
			2.0	705-9913-000	RES	4.7K						
			2.0	705-1002-000	RES	33K						
			1.0	705-9931-000	RES	51						
			2.0	705-6568-000	RES	2K						
			1.0	912-2796-000	CAP	.1						
			2.0	912-3834-000	CAP	15						
			1.0	267-9433-060	DCTR	297						
			3.0	765-1580-000	DCTR	2						
			1.0	670-6[illegible]-000	STMB							
			4.0	353-3736-010	0.001	8447198						
			10.0	352-0366-[illegible]	LUG	2#5 [illegible]				13		
			1.0	340-1044-000	BOARD	482						

CONTRACT NO

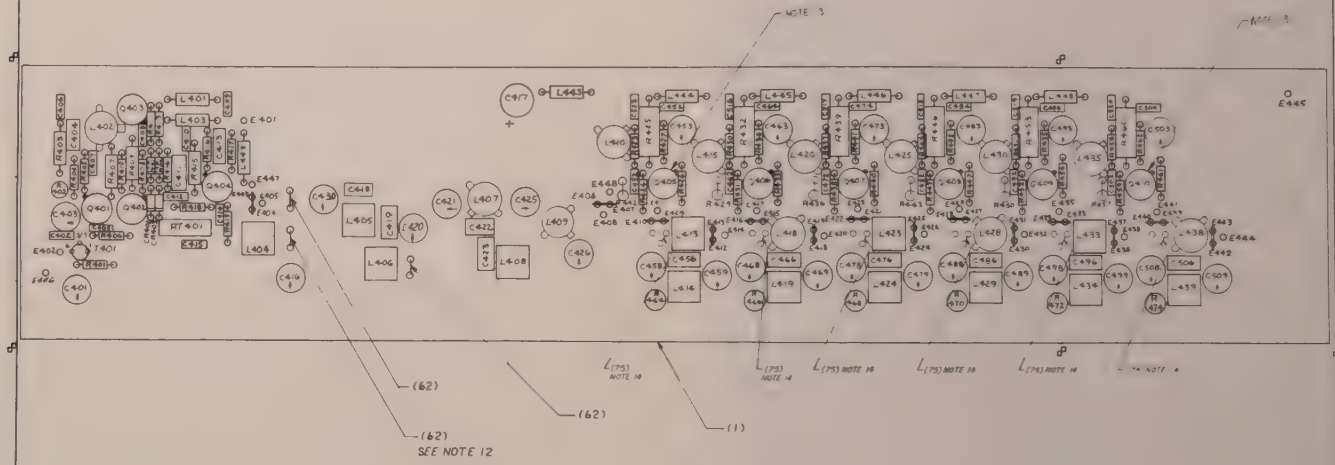
ROCKWELL INTERNATIONAL CORPORATION
COLLINS RADIO GROUP

D 13499

SIZE E

SCALE NONE

SHEET



-001

ROCKWELL INTERNATIONAL CORPORATION
COLLINS DIVISIONS

SIZE D	FSCM 13499	DWG NO 640-5659	REV H
SCALE 2/1			SHEET 2

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN PICOFARADS
   ALL INDUCTANCE VALUES ARE IN MICROHENRYS
2. SOLID BOXES INDICATE SYMBOLIZATION ON FRONT OF UNIT
3. CAPACITOR C411 MAY BE SELECTED OR OMITTED AS NECESSARY TO MEET THE SPECIFICATIONS OF 4.20.10.B.(10)
4. INDUCTORS L 411, 416, 421, 426, 431, 436, AND 449 THROUGH 454 ARE PRINTED CIRCUIT INDUCTORS

HIGHEST REF DESIG USED

Q	CR	T		C	R	E	27	J													
410	406	401	445	522	434	451	401	1													

REF DESIG NOT USED

A.C. VOLTAGE CHART
70 MHZ INPUT

TEST POINT	VRMS	DBV (REFERRED TO 1000H, 1SCI)
J-1 INPUT	0 27	0 0
Q401 C	1 5	+15 9
Q402 E	1 7	+16 3
Q403 E	1 6	+16 1
Q404 C	0 48	+5 0
E406,E407	0 20	-2 4
E409,E410	0 19	-3 0
E412,E413	0 22	-1 6
E415,E416	0 17	-3 9
E418,E419	0 23	-1 6
E421,E422	0 20	-2 4
E424,E425	0 23	-1 4
E427,E428	0 27	+0 3
E430,E431	0 26	0
E433,E434	0 22	-1 8
E436,E437,E12	0 26	0

D C VOLTAGE CHART

INPUT LEVEL 000M
SUPPLY = -19 00 VDC

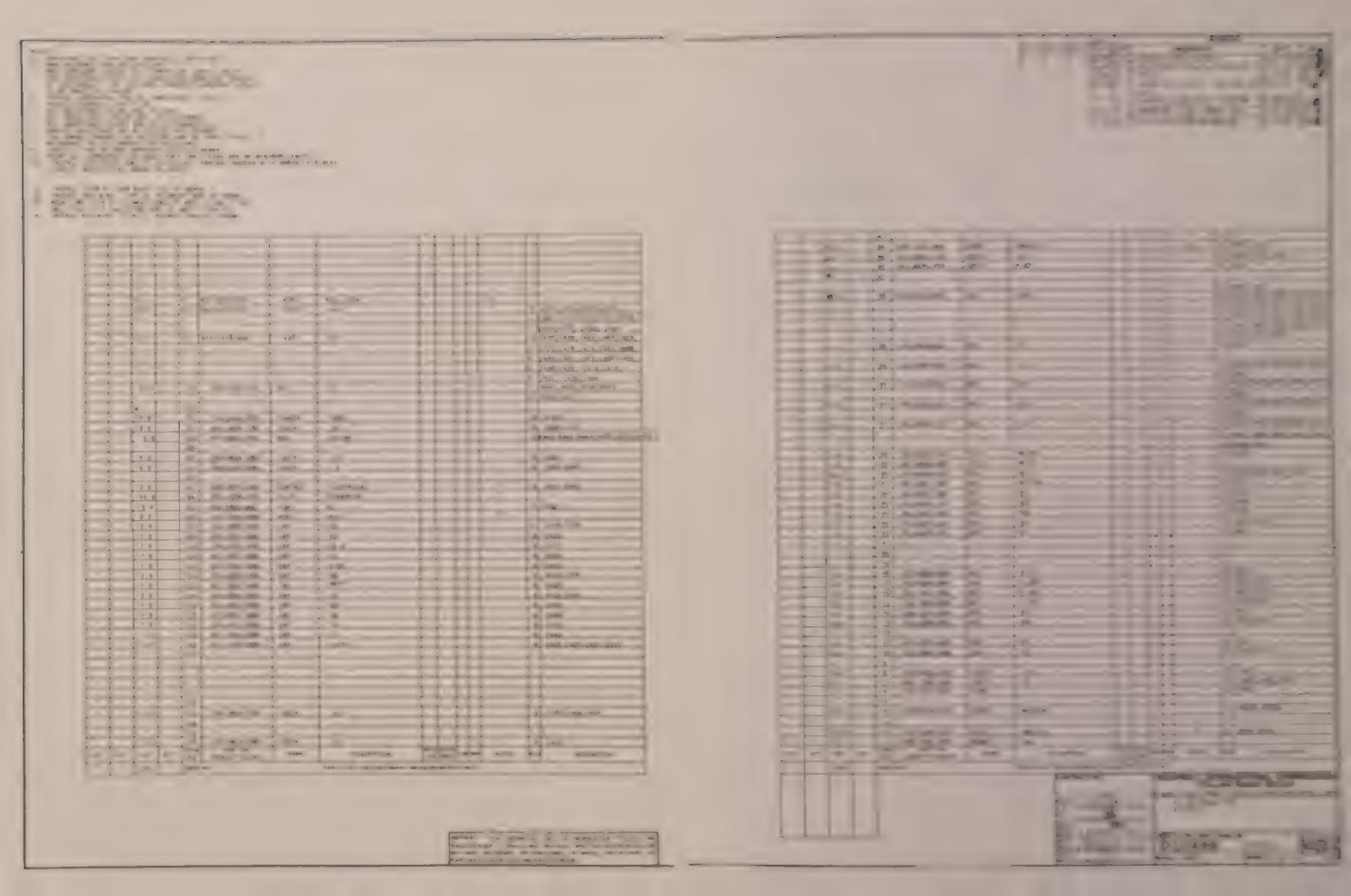
Q NO	E	B	C
401	-12 8	-13 0	7 0
402	-7 7	-7 0	0
403	-8 3	-7 7	0
404	-13 7	-12 0	-1 8
405-409	-10 8	10 1	-1 1
410	-10 8	-10 12	0

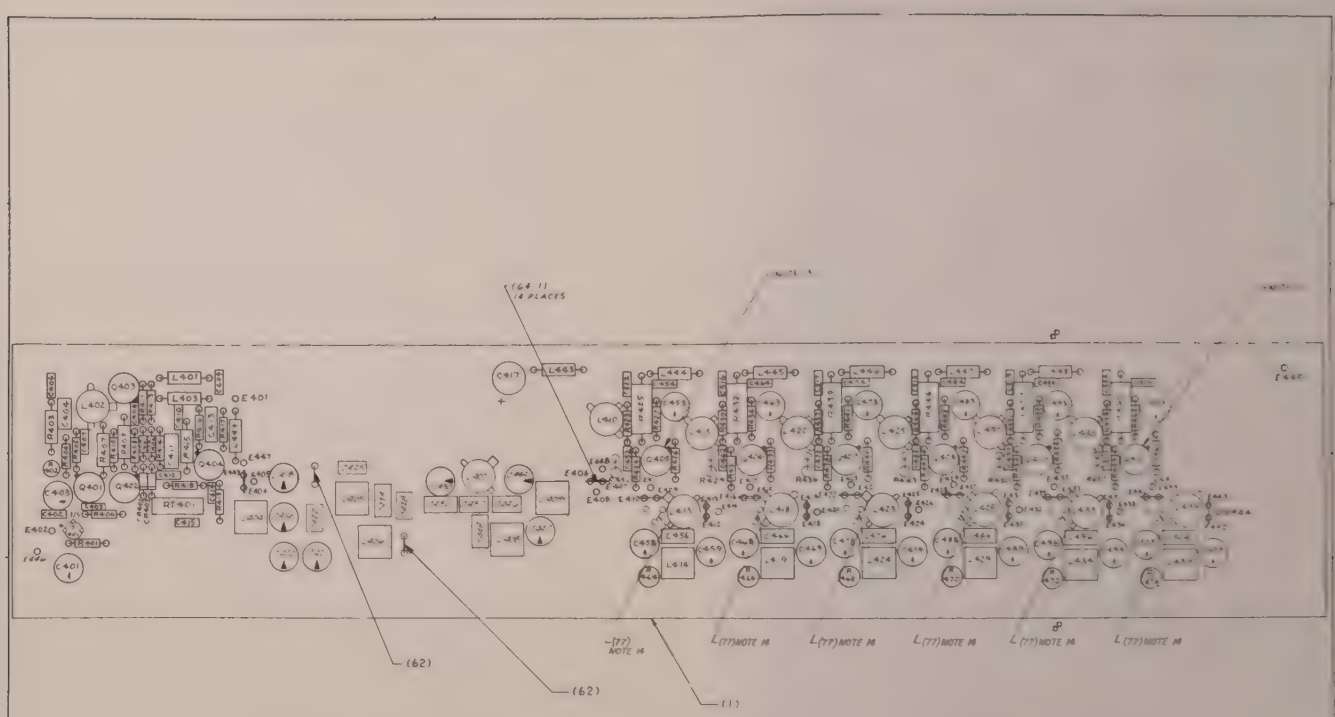
FROM C1

70 MHZ INPUT

FILTER BOARD

13399

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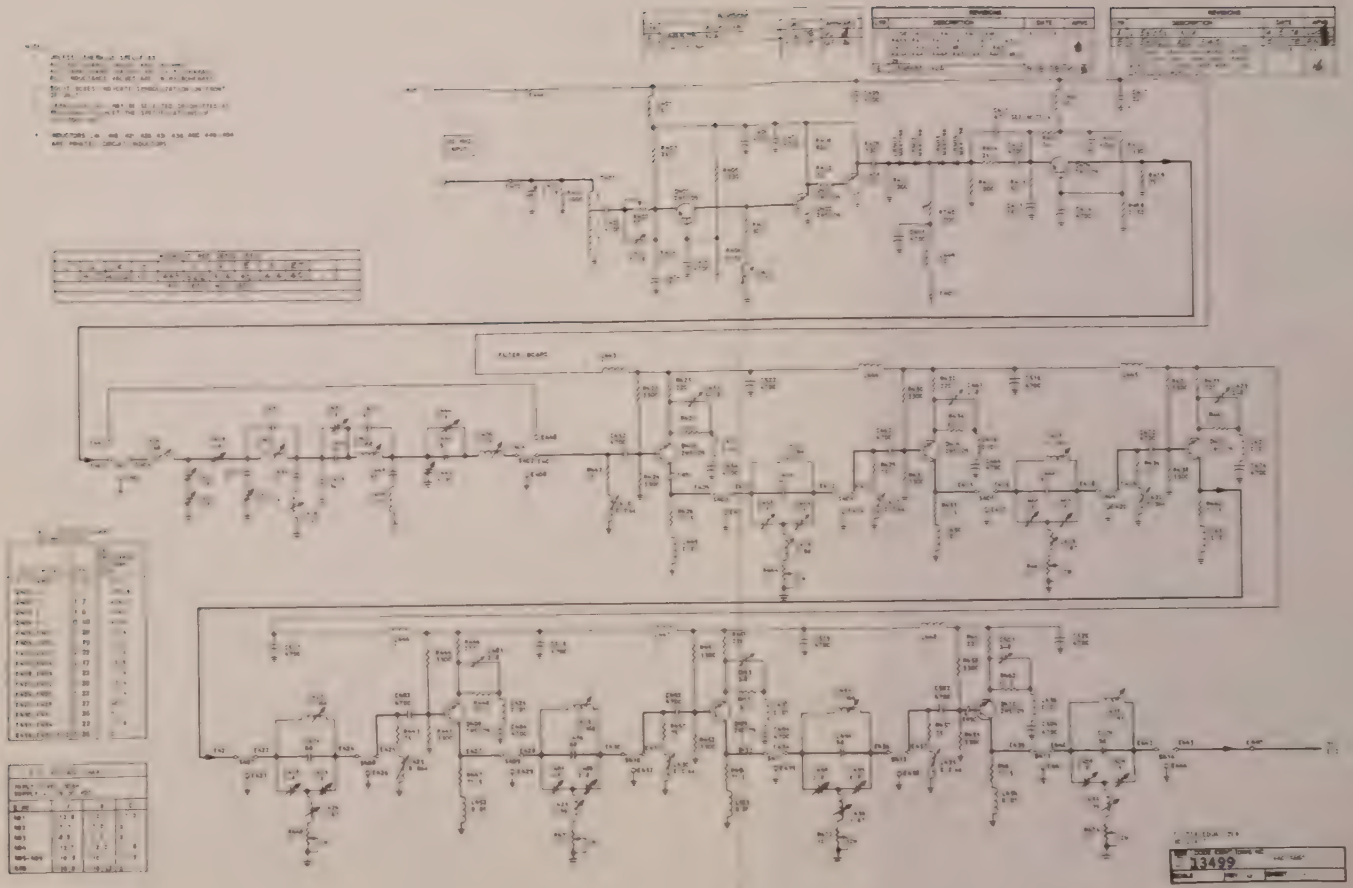
13499

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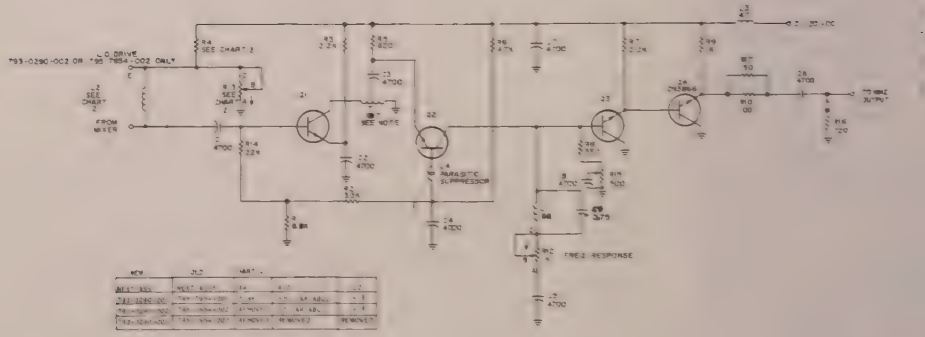
CHECKED BY [illegible]



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[illegible]	[illegible]	REMOVED REMOVED

22	[illegible]	[illegible]	[illegible]
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24	[illegible]	[illegible]	[illegible]

COLLINS RADIO COMPANY

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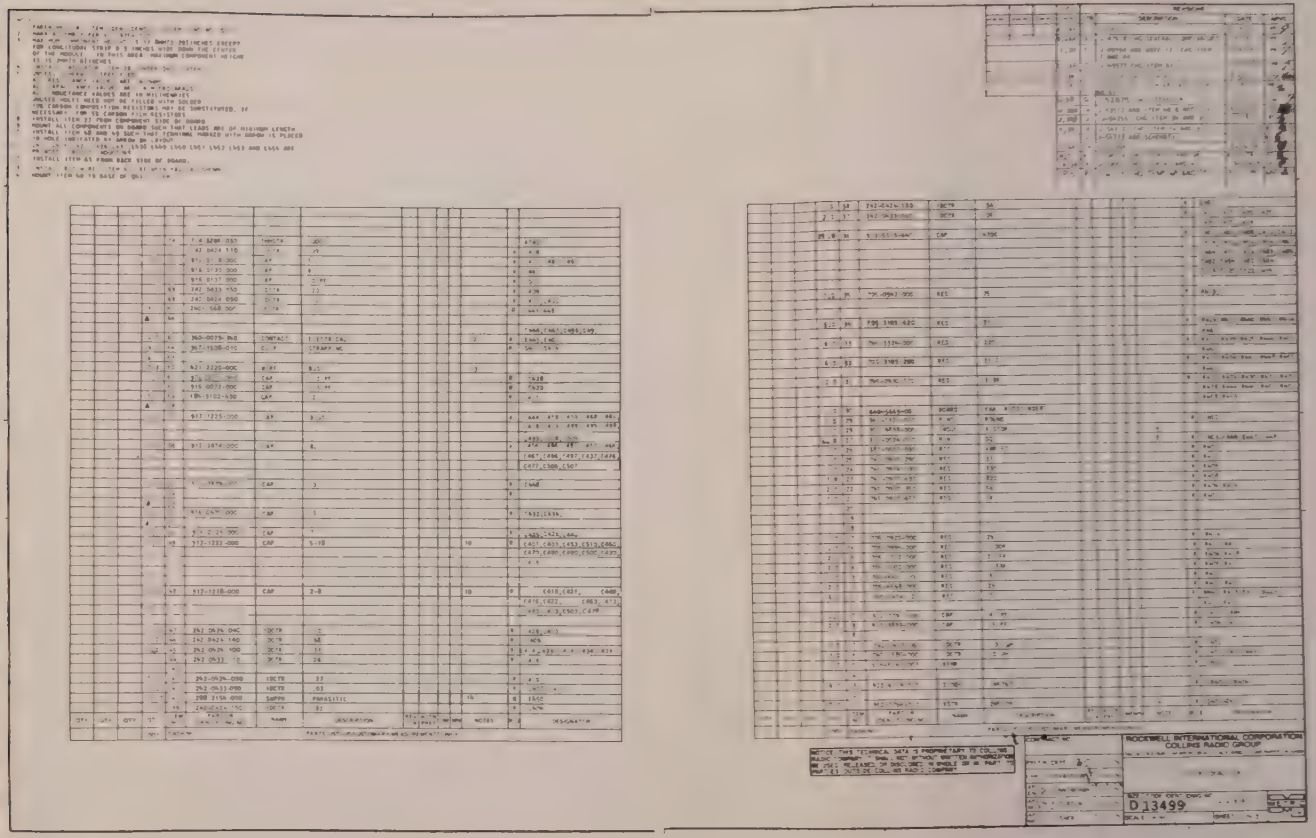

ROCKWELL INTERNATIONAL CORPORATION
COLLINS RADIO GROUP

D13499

NOTES

1. UNLESS OTHERWISE SPECIFIED ALL HARDWARE TO BE DEFINED AS FOLLOWS:
   - ☐ 112-40 CRES
   - ✓ 188-32 CRES
   - ☐ 164-32 CRES
   - ☐ 190-32 CRES
2. FOR ALL CORE WIRING INFORMATION, SHOWS CORE WIRING FOR ALL POSSIBLE COMBINATIONS OF EQUIPMENT
3. INSTALL CABLE MARKERS ITEMS 35 THRU 62 ON APPROPRIATE CABLE ENDS
4. MOUNT NAME PLATE ITEM 68 ON BOTTOM OF CASE ITEM 1 APPROX CENTERED
5. PARENTHETICAL ITEM IDENT DENOTES (ITEM NO -QTY)
6. TIE BACK ANY UN-USED CABLING.
8. SLEEVE AND TIE BACK ANY UNUSED WIRES INDICATED AT SWITCH END
9. MOUNT FLAT WASHERS UNDER HEADS OF SCREWS WHEN MOUNTING RUBBER BUMPERS, ITEMS 109

REVISIONS

LTR	DESCRIPTION	DATE	APVD

ITEM NO	PART OR IDENTIFYING NO	NAME	DESCRIPTION	REV ALTN LTR	PREF	UNUSED	NOTES
			EQUIP				
			WIRE TYPE				
108	205-6016-000	BUMPER	RUBBER				
58	W21-2220-000	WIRE	BUS 22 AWG				
59	304-3314-000	LUG	SOLDER				
106	312-1000-230	SLEEVING					
105	312-1000-230	SLEEVING					
36	172-3022-000	TERMINAL	QCAP				
37	439-4134-000	WIRE	CC1				
38	439-4135-000	WIRE	CC6				
100	439-4138-000	WIRE	CC5				
39	439-4139-000	WIRE	CC4				
40	439-4137-000	WIRE	CC3				
41	439-4136-000	WIRE	CC2				
34	439-4135-000	WIRE	CC1				
35	439-4134-000	WIRE	CC0				
94	439-7019-000	WIRE	DA903				
93	439-7038-000	WIRE	DA902				
92	439-7037-000	WIRE	DA96				
91	439-7036-000	WIRE	DA95				
90	439-7035-000	WIRE	DA93				
89	439-7034-000	WIRE	DA92				
88	439-7033-000	WIRE	DA91				
87	439-7032-000	WIRE	DA90				
86	439-7031-000	WIRE	DA9				
85	439-7142-000	WIRE	DA8				
84	439-7010-000	WIRE	DA7				
83	439-7074-000	WIRE	DA6				
82	439-7069-000	WIRE	DA5				
81	439-7073-000	WIRE	DA4				
80	439-7072-000	WIRE	DA3				
79	439-7068-000	WIRE	DA2				
78	439-7071-000	WIRE	DA1				
77	439-7096-000	WIRE	DA0				
76	150-0000-000	CLAMP	CABLE .250 DIA				
75	150-1554-000	CLAMP	CABLE .25 DIA				
74	150-1540-000	CLAMP	CABLE .5 DIA				
73	304-1259-000	KNOB	KNURLED				
72	432-3005-060	ROPE	WIRE				
71	342-4004-000	SCREW	PAN HD 6-32 X .38 PERM				
70	331-1007-000	NUT	HEX THK 32				
69	348-2484-001	SPACER					
68	640-2835-307	NAMEPLATE	ID-728-7				*
68	640-2835-306	NAMEPLATE	ID-728-6				*
68	640-2835-305	NAMEPLATE	ID-728-5				*
68	640-2835-304	NAMEPLATE	ID-728-4				*
68	640-2835-003	NAMEPLATE	ID-728-3				*
68	640-2835-002	NAMEPLATE	ID-728-2				*
68	640-2835-001	NAMEPLATE	ID-728-1				*
67	161-0160-060	PLUG	.750 NYL				
66	627-7093-003	ASSY	FILT EQUAL TO 4MZ 8W				
65	627-7093-002	ASSY	FILT EQUAL TO 4MZ 8W				
64	627-7093-001	ASSY	FILT EQUAL TO 4MZ 8W				
63	627-7094-001	AMPL	AGC				
62	152-0013-780	MARKER	CABLE OUT				1
61	152-0013-770	MARKER	CABLE IN				1
60	152-0013-180	MARKER	CABLE 24V				1
59	152-0066-750	MARKER	CABLE PTS				1
58	152-0066-760	MARKER	CABLE REM				1

ITEM NO	PART OR IDENTIFYING NO	NAME	DESCRIPTION	REV ALTN LTR	PREF	UNUSED	NOTES
			WIRE TYPE				
57	439-7039-000	WIRE	DA94				
56	439-7040-000	WIRE	DA97				
55	439-7041-000	WIRE	DA98				
54	439-7042-000	WIRE	DA99				
53	439-7043-000	WIRE	DA910				
52	439-7044-000	WIRE	DA911				
51	439-7045-000	WIRE	DA912				
50	439-7046-000	WIRE	DA913				
49	439-7047-000	WIRE	DA914				
48	439-7048-000	WIRE	DA915				
47	439-7049-000	WIRE	DA916				
46	439-7050-000	WIRE	DA917				
45	439-7051-000	WIRE	DA918				
44	439-7052-000	WIRE	DA919				
43	439-7053-000	WIRE	DA920				
42	439-7054-000	WIRE	DA921				
33	439-7055-000	WIRE	DA922				
32	439-7056-000	WIRE	DA923				
31	439-7057-000	WIRE	DA924				
30	439-7058-000	WIRE	DA925				
29	439-7059-000	WIRE	DA926				
28	439-7060-000	WIRE	DA927				
27	439-7061-000	WIRE	DA928				
26	439-7062-000	WIRE	DA929				
25	439-7063-000	WIRE	DA930				
24	439-7064-000	WIRE	DA931				
23	439-7065-000	WIRE	DA932				
22	439-7066-000	WIRE	DA933				
21	439-7067-000	WIRE	DA934				
20	439-7070-000	WIRE	DA935				
19	439-7075-000	WIRE	DA936				
18	439-7076-000	WIRE	DA937				
17	439-7077-000	WIRE	DA938				
16	439-7078-000	WIRE	DA939				
15	439-7079-000	WIRE	DA940				
14	439-7080-000	WIRE	DA941				
13	439-7081-000	WIRE	DA942				
12	439-7082-000	WIRE	DA943				
11	439-7083-000	WIRE	DA944				
10	439-7084-000	WIRE	DA945				
9	439-7085-000	WIRE	DA946				
8	439-7086-000	WIRE	DA947				
7	439-7087-000	WIRE	DA948				
6	439-7088-000	WIRE	DA949				
5	439-7089-000	WIRE	DA950				
4	439-7090-000	WIRE	DA951				
3	439-7091-000	WIRE	DA952				
2	439-7092-000	WIRE	DA953				
1	439-7093-000	WIRE	DA954				

REVISED AND REDRAWN 1-27-78

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MATERIAL: NONE

FINISH: NONE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE IN METRIC UNITS. DIMENSIONS IN PARENTHESES ARE IN INCHES.

METRIC	INCH-POUND
TOL IN METRIC UNITS XX = ±0.2 XXX = ±0.13	TOL IN INCH-POUND UNITS XX = ±.01 XXX = ±.005
HOLE DIAMETERS	HOLE DIAMETERS
UNDER 4.38 = +0.13 -0.0	UNDER .172 = .005 .000
4.38 THRU 12.70 = +0.18 -0.0	.172 THRU .500 = .007 .000
OVER 12.70 = +0.20 -0.0	OVER .500 = .008 .000
ANGLES ±1°	ANGLES ±1°
SUBSTRUCTURE BETWEEN MEMBERS IN AN AXIS NOT TO EXCEED 0.25	SUBSTRUCTURE BETWEEN MEMBERS IN AN AXIS NOT TO EXCEED .010
PART EQUAL TO MIL-STD-100	RADIO GROUP STANDARD

CONTRACT NO

PREP

CHK

APVD

ROCKWELL INTERNATIONAL CORPORATION
COLLINS RADIO GROUP

SIZE D

CAGE CODE 04713

SIZE CODE IDENT DWG NO

D 13499

SCALE NONE

SHEET

MAINTENANCE

UD-72B CARRIER TO NOISE TEST SET

MAINTENANCE

1. GENERAL

The procedures in this section are to be used as an aid in the maintenance and troubleshooting of the carrier to noise test set.

2. MAINTENANCE PHILOSOPHY

Because of the complex alignment requirements of the UD-72B Carrier to Noise Test Set, some of the modules cannot be adjusted or replaced in the field. Whenever one of these modules is found to be defective, the test set is designated nonfield repairable, and must be returned to the factory for repair and alignment. Refer to paragraph 7, Module Replacement.

3. TEST EQUIPMENT REQUIRED

Table 1 provides a list of recommended test equipment. Other units of equivalent capability may be substituted.

Table 1. Test Equipment.

ITEM	DESCRIPTION
BNC-to-WECo Adapter	PN 361-0149-000 NOTE Ensure that meter used has thermal sensing, not diode rms sensing.
RF Power Meter	Hewlett-Packard 436A with 8483A, 75 ohm power sensor (thermistor type power meter)
Volt-Ohm-Milliammeter	Simpson 260
Spectrum Analyzer	Hewlett-Packard 141T with 8552B and 8553B plug-in sections
Minimum Loss Pad, 50 to 75 ohms	PN 126-2443-010 CAUTION 75 ohm Type N connector will not mate with standard Type N connector without damage. Marking of special adapter is recommended.
Adapter, BNC-to-Type N	PN 357-9173-000

4. PERIODIC CHECKS

The output of the carrier to noise test set should be compared with its specifications in accordance with the procedures described in paragraph 5 after any of the following:

Six months of use

Damage to the test set

Recalibration of associated test equipment

Long period of storage.

5. CHECKS AND ADJUSTMENTS

The following paragraphs describe the procedures used to check the overall operating condition of the test set, and the operating condition of each of the replaceable units of the test set. In general terms, maintenance of the signal to noise test set consists of the following steps, performed in the order given.

a. Check the output noise level.

b. Check the output noise bandwidth.

c. If the results of steps a. and b. are satisfactory, no further checks are required. Return the test set to use as required.

d. If the results of steps a. and b. indicate that the test set is not operating within its specified limits, check each of the replaceable units of the test set. If one of the replaceable units checks bad, replace it and repeat steps a., b., and c.

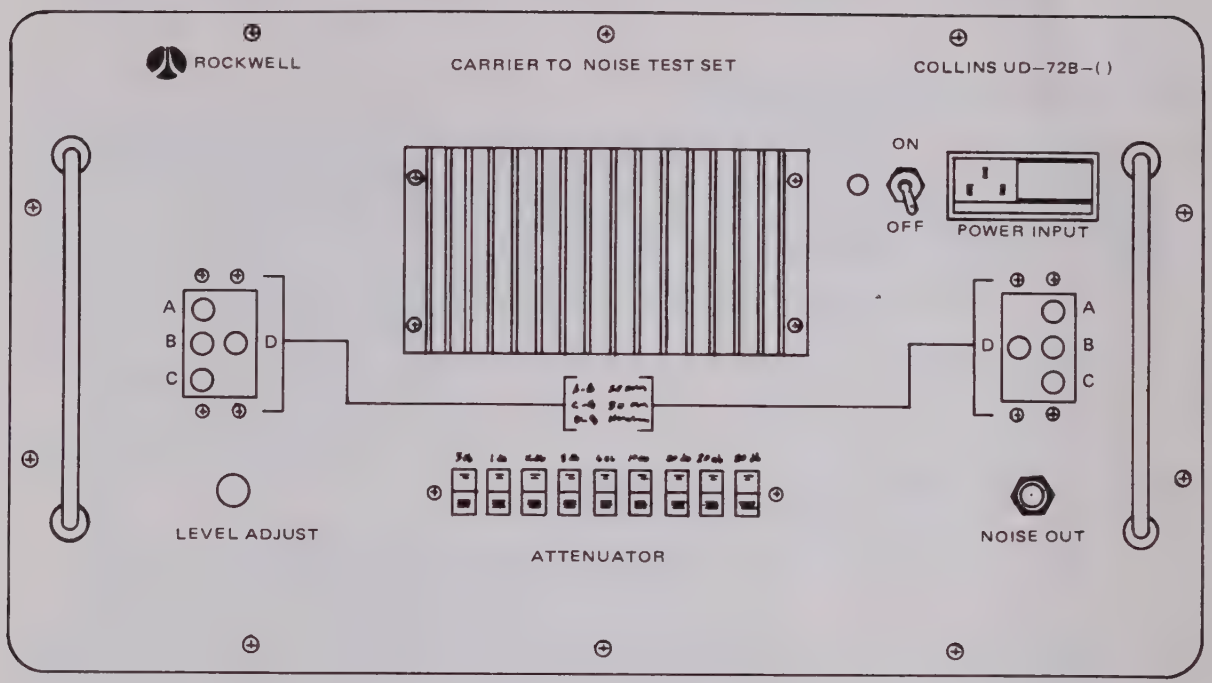
e. If the checks of all the replaceable units indicate no fault, but the results of steps a. and b. are unsatisfactory, the fault is probably in either the filter/equalizer or the agc amplifier. These two units cannot be adjusted or replaced in the field. Return the carrier to noise test set to the factory for repair and recalibration.

Only two adjustments may be performed in the field. These are: LEVEL ADJUST, on the test set front panel (paragraph 5.1); and VOLTAGE ADJ, on the dc power supply (paragraph 5.3).

The major replaceable units are: dc power supply, noise generator, attenuator assembly, and output amplifier. Connectors, switches, and other components that are not integral parts of either the filter/equalizer or the agc amplifier are also field replaceable, as is the directional coupler.

5.1 Output Noise Level Test

a. Using a 75 ohm coax cable, connect NOISE OUT on the front panel of the test set (figure 1) to the input of an average reading rf power meter (table 1).



ITEM	FUNCTION
CONTROLS: ON/OFF SWITCH	APPLIES LINE VOLTAGE TO INTERNAL POWER SUPPLY.
ATTENUATOR	NINE-SWITCH ATTENUATOR INSERTS ATTENUATION TO THE SIGNAL PATH, PROVIDING A STEP ATTENUATION OF THE OUTPUT FROM 0.0 TO 82.5 DB IN STEPS OF 0.5 DB.
JACKFIELD	ALLOWS THE OPERATOR TO SELECT, BY MEANS OF LOOPING PLUGS, THE THREE INTERNAL IF, FILTER/EQUALIZERS.
LEVEL ADJUST	PROVIDES ADJUSTMENT OF THE OUTPUT LEVEL OF THE BANDWIDTH LIMITED NOISE.
INDICATORS: PILOT LIGHT	INDICATES THAT LINE VOLTAGE IS APPLIED INTERNALLY.
FUSEHOLDER	BLOWN FUSE INDICATES PROBLEM INTERNALLY. CIRCUIT CARD WITHIN HOLDER INDICATES VOLTAGE LEVEL THAT TEST SET IS ADJUSTED FOR.
NOISE OUT	SIGNAL POINT FOR THE OUTPUT OF THE TEST SET.

MW116-0012-2

Figure 1. Carrier to Noise Test Set, Controls and Indicators.

b. On the front panel of the test set, set the ATTENUATOR switches for minimum attenuation, and adjust the LEVEL ADJUST control for a +10 dBm (average) reading on the power meter.

c. Disconnect test equipment.

5.2 Output Noise Bandwidth Test

a. Using a 75 ohm coax cable, connect NOISE OUT on the front panel of the test set to the input of the spectrum analyzer (figure 2).

b. On the spectrum analyzer:

1. Use the minimum loss pad.

2. Set the input attenuator for 40 dB attenuation.

3. Turn on the video filter.

4. Set the sweep from 0 to 110 MHz.

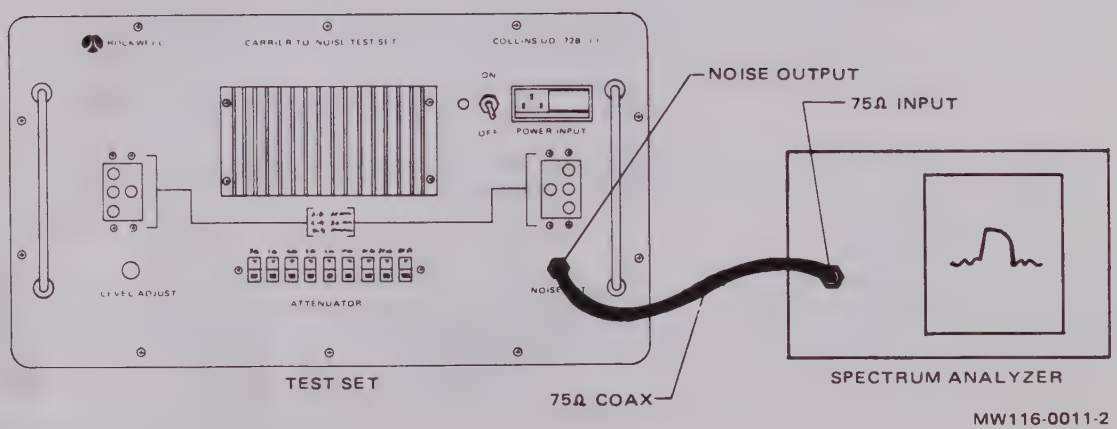


Figure 2. Spectrum Analyzer Connections.

NOTE

An adjustment in the accuracy of the specification comparison must be made dependent upon the accuracy of resolution of the spectrum analyzer being used.

c. The response curve on the spectrum analyzer should have the amplitude, follow the waveform shape, and remain within the specifications shown in figure 3, 4, or 5, depending on which bandwidth is being checked.

d. If the test set contains more than one filter/equalizer, remove the shorting plugs from the two front panel jackfields, reinsert them to connect the second filter/equalizer, and repeat step c. Then, if the test set contains all three filter/equalizers, reinsert the shorting plugs to connect the third filter/equalizer, and again repeat step c.

e. Disconnect test equipment.

5.3 DC Power Supply Test

WARNING

Dangerous voltages are present inside the test set case. Take care to avoid contact with any voltage point.

a. Remove the test set assembly (which is mounted on the front panel) from the case (figure 6).

b. Rest back side of assembly on bench top. Turn the assembly so that the NOISE OUT jack is to the back of the bench (figure 7).

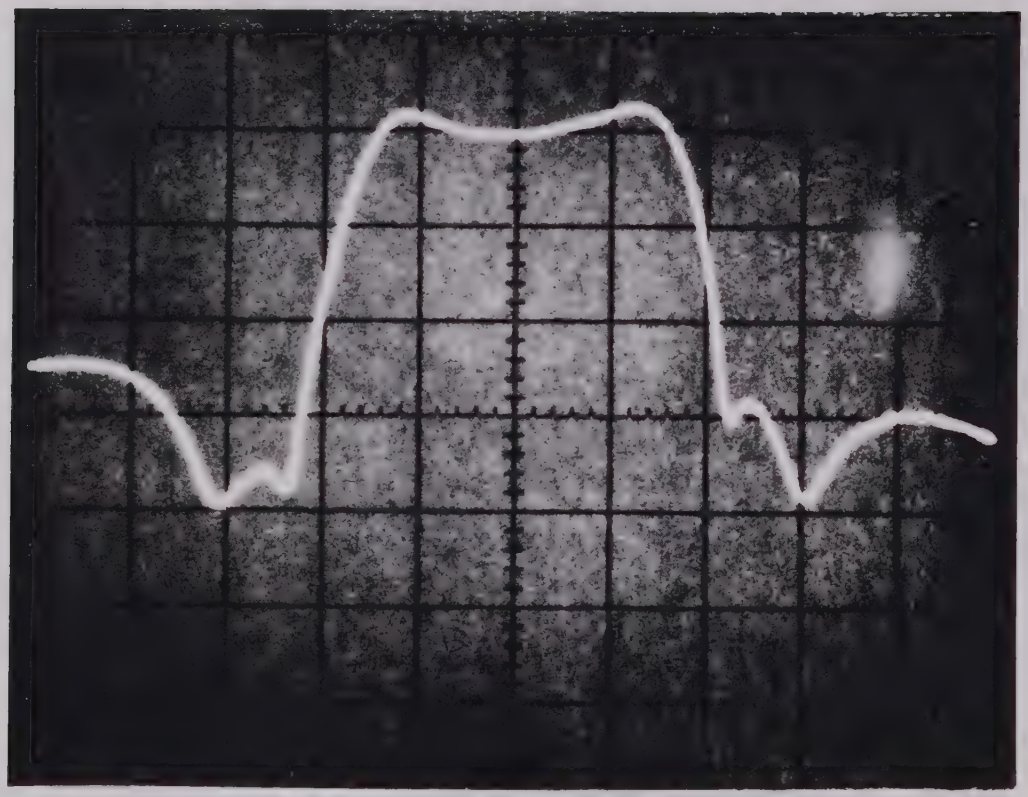
NOTE

When selecting power connector P9, P12, or P15 for test, choose one to a filter/equalizer either not installed, or not in use. P9 powers the 40 MHz filter/equalizer, P12 the 30 MHz filter/equalizer, and P15 the 20 MHz filter/equalizer.

c. In the front panel jackfields, insert the two coax looping plugs to connect the filter/equalizer selected to test the dc power supply. This is necessary because the looping plugs close switches to connect the dc power to the circuits (refer to the test set schematic diagram 622-4114, sheet 4).

d. Connect the volt-ohm-milliammeter (VOM) to the plug for the selected filter/equalizer (either P9, P12, or P15), with the positive lead connected to pin 1 and the negative lead connected to pin 2.

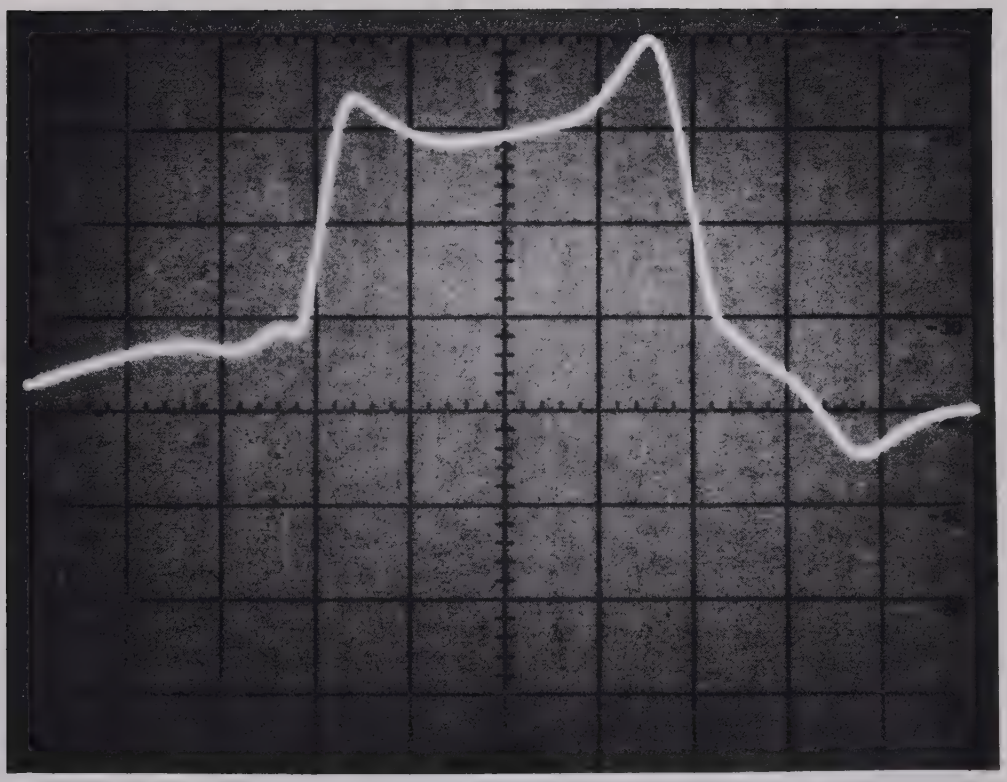
e. The indication on the VOM should be -20 ±0.2 volt. If this reading is obtained, disconnect the test equipment and replace the test set assembly in its case. If the correct reading is not obtained, proceed to step f.



TYPICAL MDR-8N/11N/12 AMPLITUDE RESPONSE WAVEFORM

5 MHz/Division
10 dB/Division
70 MHz Center Frequency

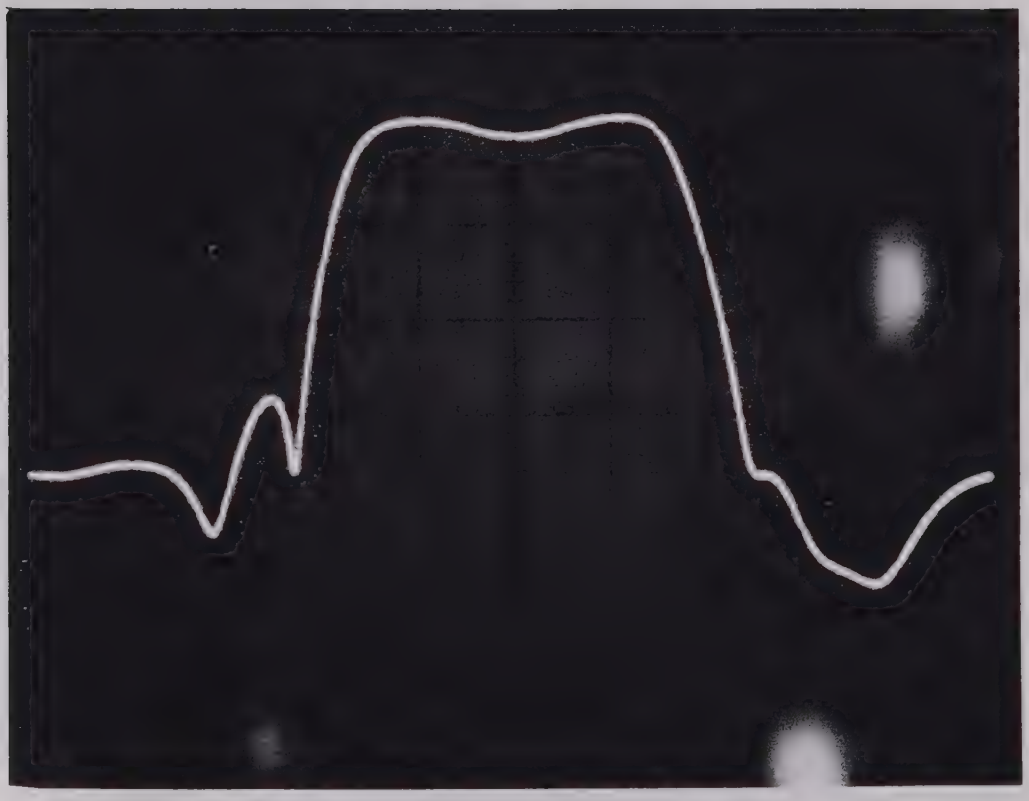
Figure 3. Noise Output Waveform, 20 MHz.



TYPICAL MDR-6 AMPLITUDE RESPONSE WAVEFORM

10 MHz/Division
10 dB/Division
70 MHz Center Frequency

Figure 4. Noise Output Waveform, 30 MHz.



TYPICAL MDR-11 AMPLITUDE RESPONSE WAVEFORM

10 MHz/Division
10 dB/Division
70 MHz Center Frequency

Figure 5. Noise Output Waveform, 40 MHz.

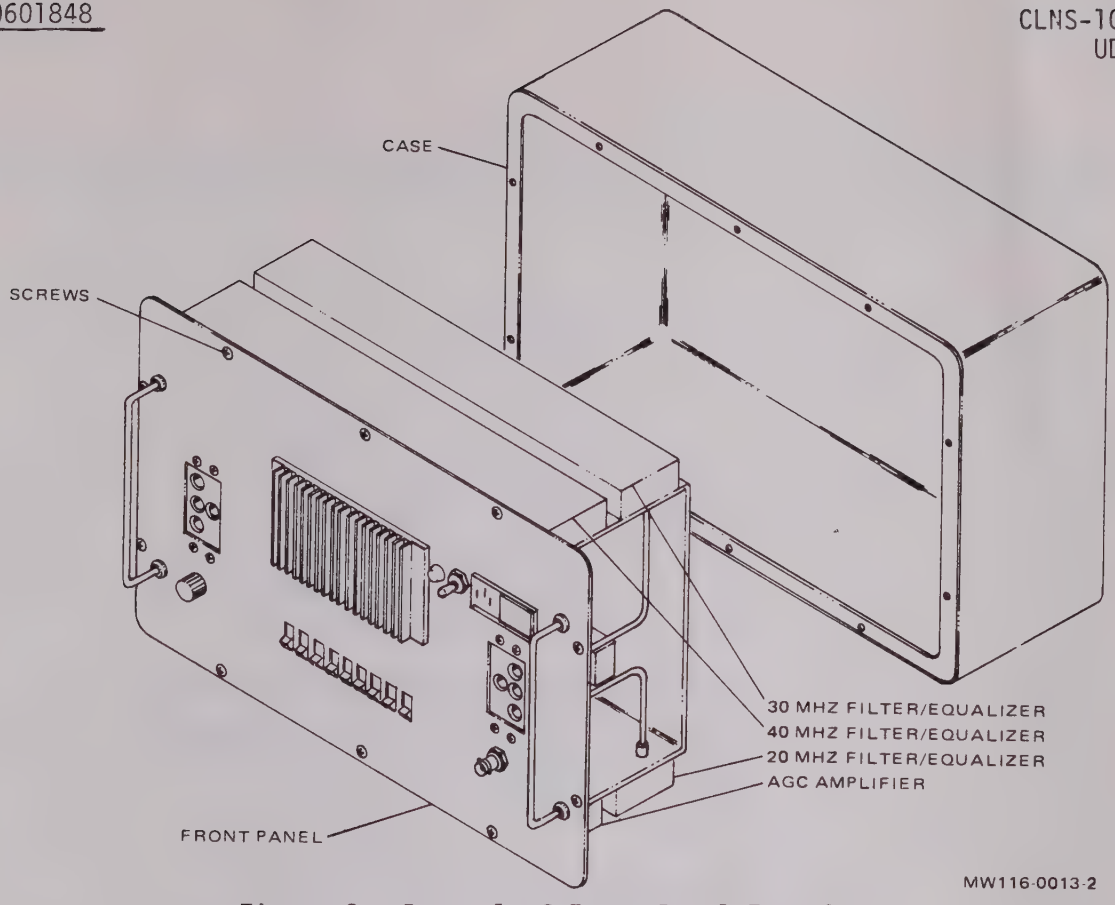


Figure 6. Removal of Front Panel From Case.

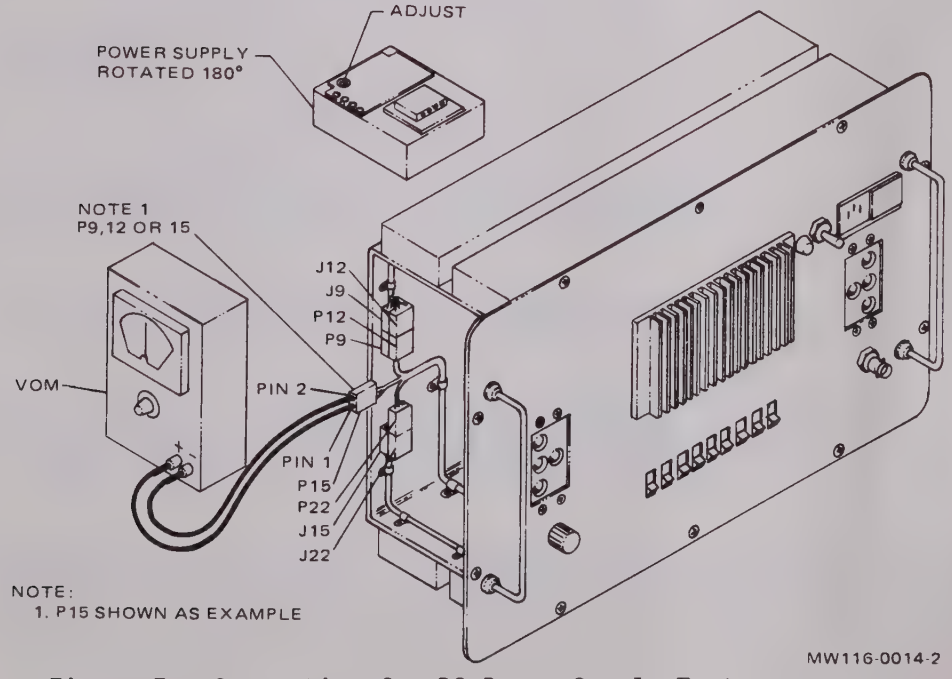


Figure 7. Connection for DC Power Supply Test.

f. Adjust the VOLTAGE ADJ control on the dc power supply (figure 7) for an indication of -20 ±0.2 volt. If this reading is obtained, disconnect the test equipment and replace the test set assembly in its case. If the correct indication cannot be obtained, proceed to step g.

g. If the voltage is more negative than -20.2 volts and cannot be adjusted to the correct value, replace the dc power supply and return to step c. If the voltage is less negative than -19.8 volts and cannot be adjusted to the correct value, proceed to step h.

h. If the voltage is low (less negative than -19.8 volts), disconnect P2 from J2 and observe whether the voltage reading returns to normal. If it does, replace the noise generator and return to step c. If it does not, proceed to step i.

i. Reconnect P2 to J2. Disconnect P25 from J25, and observe whether the voltage reading returns to normal. If it does, replace the (output) noise amplifier and return to step c. If it does not, proceed to step j.

j. Reconnect P25 go J25. Replace the dc power supply and return to step c.

k. When the test results are satisfactory, disconnect the test equipment, and replace the test set assembly in its case.

5.4 Step Attenuator Assembly Test

a. Remove the front panel from the test set case (figure 6).

b. Disconnect input and output BNC connectors from the step attenuator assembly.

c. Using 75 ohm coax cable, connect 75 ohm input, average power reading rf power meter to output connector J21 on the agc amplifier module.

d. With the OUTPUT ADJUST control on the front panel of the test set, adjust the output level of the agc amplifier to a value as shown on the rf power meter of 0 dBm.

e. Disconnect the power meter from J21, and reconnect J21 to the step attenuator input (which is at the same end of the attenuator assembly as the 0.5 dB rocker switch).

f. Using 75 ohm coax cable, connect the rf power meter to the output connector of the step attenuator assembly.

g. Enable each step attenuator rocker switch, one at a time. For each switch, compare the output reading on the rf power meter to the value set in step d. For each switch, the difference should be within one percent of the attenuation value silkscreened above the switch.

h. If any rocker switches do not meet the requirements of step g., replace the entire attenuator switch assembly and return to step c. If all rocker switches function satisfactorily, disconnect the power meter, and reconnect the step attenuator output to J23 on the output noise amplifier.

i. If the operation of the output noise amplifier is to be tested, proceed immediately to paragraph 5.5, Output Amplifier Test. If not, replace the test set in its case.

5.5 Output Amplifier Test

NOTE

Successful performance of the following procedure requires that the step attenuator assembly test, paragraph 5.4, shall have been satisfactorily completed.

a. Using 75 ohm coax cable, connect 75 ohm input, average power reading rf power meter to output connector J21 on the agc amplifier module.

b. With the OUTPUT ADJUST control on the front panel of the test set, adjust the output level of the agc amplifier to 0 dBm as indicated on the rf power meter.

c. Disconnect the power meter from J21, and reconnect J21 to the step attenuator assembly input. Set all ATTENUATOR switches on the test set front panel for minimum attenuation.

d. Using 75 ohm coax cable, connect NOISE OUT on the test set front panel to the input of the rf power meter.

e. The rf power meter should indicate an output level of +17 dBm.

f. If the output level reading is not satisfactory, replace the output amplifier and return to step a. If the output level reading is as indicated in step e., disconnect the test equipment and replace the test set assembly in its case.

5.6 Noise Generator Test

NOTE

The output of the noise generator is available at coaxial jack B in the jackfield at the left side of the test set front panel.

a. Connect the output of the noise generator to the input of the spectrum analyzer.

b. Check the spectrum from 40 to 100 MHz. The signal displayed on the spectrum analyzer should be broadband random noise. No discrete signals should be visible.

c. On the spectrum analyzer, use the minimum loss pad, turn the video filter on, and set the bandwidth to 300 kHz. Measure the noise output level; this should be not less than -61 dBm.

d. On the spectrum analyzer, check the noise output vs. frequency. The noise level at 50 MHz and at 90 MHz must be within ±0.2 dB of the noise level at 70 MHz.

e. If the signal on the spectrum analyzer fails to meet the requirements of steps b., c., and d., replace the noise generator and return to step b. If the noise generator output signal is satisfactory, disconnect the test equipment.

6. TYPICAL ALIGNMENT PROCEDURE

To demonstrate the use of the carrier to noise test set in slicing and BER alarm alignment of MDR series microwave digital radios, the following general procedure is presented. For specific test result values, refer to the BER procedure in the instruction book for the radio being tested.

Test equipment required for the performance of this procedure is listed in CLNS-01-001, tables 2 and 3. Figure 8 illustrates the test setup.

6.1 BER Alignment Procedure

a. Lock the receiver under test out of service.

b. Disconnect cable from J1 on decoder/descrambler of receiver under test.

c. Connect decoder/descrambler output to J2 of the output rate converter on the DS-3 test set receive section. Connect the DS-3 output to the Tau Tron receiver test set.

d. At J1 on the 8PSK demodulator, disconnect the if. input cable. Plug the directional coupler OUTPUT plug directly into J1 on the demodulator, and plug the if. input cable into the INPUT jack on the directional coupler.

e. Connect the 75 ohm termination to COUPLED PORT on the directional coupler.

f. Measure and record the signal level at the directional coupler output.

g. Disconnect the if. input cable from the directional coupler.

h. Remove the 75 ohm termination from COUPLED PORT and connect it to INPUT on the directional coupler.

i. Using 75 ohm coax cable, connect the NOISE OUT jack of the carrier to noise test set to COUPLED PORT on the directional coupler.

j. On the carrier to noise test set, set all ATTENUATOR switches for zero attenuation.

k. Using the LEVEL ADJUST control on the carrier to noise test set, adjust the noise level at the directional coupler output to a value below the signal output recorded in step f. This value (below the recorded signal output) is determined by reference to the instruction book for the specific radio under test.

l. Select the worst case recovered carrier phase. This is done by tapping the receive oscillator, or by intermittent disconnect.

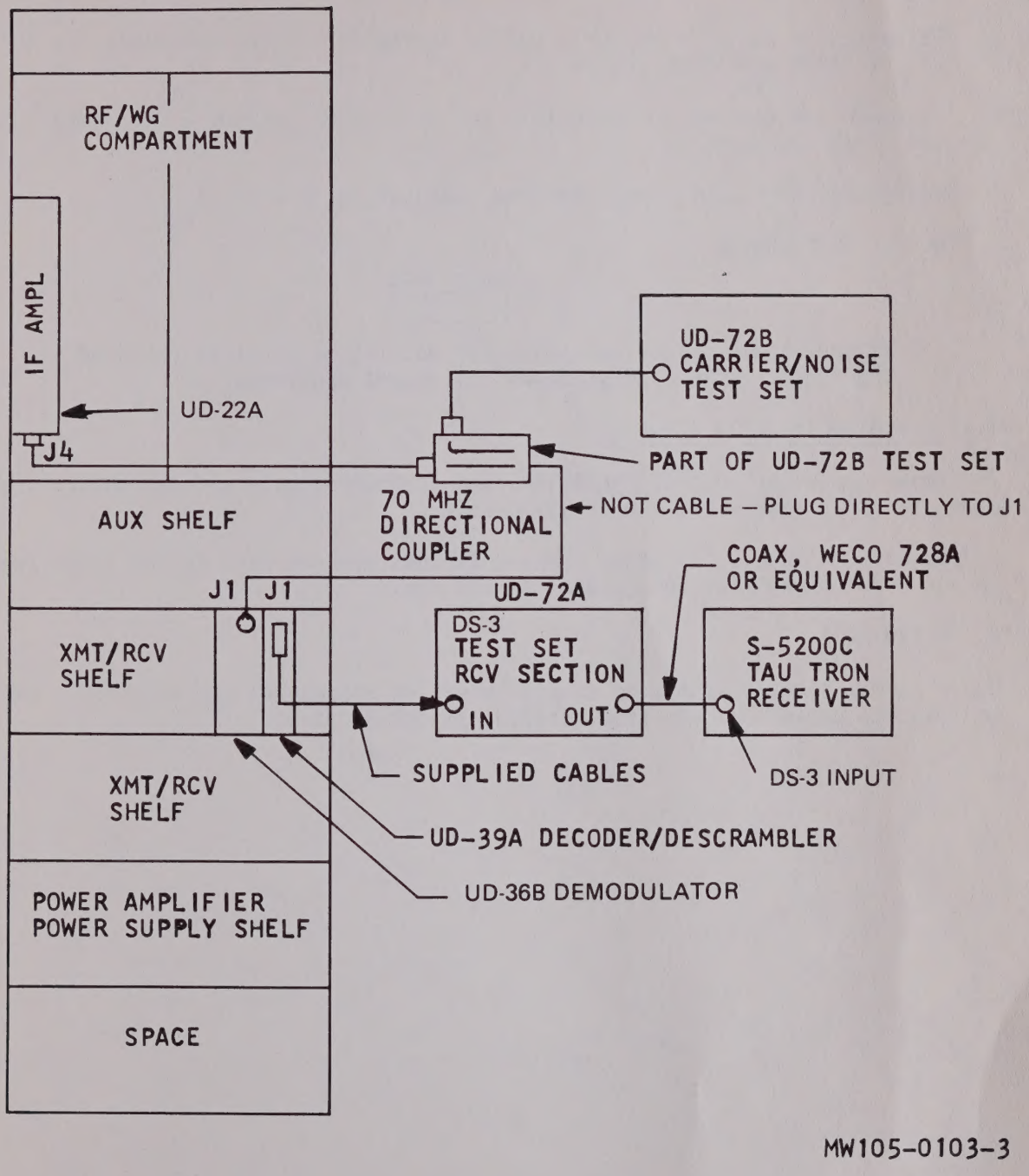


Figure 8. BER Alarm Test Setup.

m. Read the noise parity indication. This should be better than 1 X 10^{-6}; refer to the instruction book for the specific radio under test to determine the precise figure.

n. Decrease the noise level for a parity indication of approximately 2 X 10^{-8}. Observe that the alarm LED is lit.

o. Increase the carrier to noise test set ATTENUATOR setting 1 dB. Verify that the alarm LED is off.

p. Disconnect test equipment. Restore receiver to service.

7. MODULE REPLACEMENT

CAUTION

Filter/equalizer and agc amplifier modules must not be replaced in the field, because of stringent alignment requirements.

7.1 Field Replaceable Elements

The noise generator, output amplifier, and dc power supply modules and the step attenuator switch assembly are field replaceable.

Connectors, switches, and other components that are not part of the filter/equalizer or agc modules may also be replaced in the field.

8. CLEANING

Under normal circumstances, no special cleaning procedures are required. Care must be taken to prevent fluids from entering switch openings.